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Some Observations on the Oestrogenic Induction of Lactation in Cattle

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INTRODUCTION

In the past few years infertility in cattle has become increasingly prevalent, and from an economic standpoint its incidence in some herds has reached alarming proportions. The National Veterinary Medical Association (1940) have assessed the annual monetary loss arising from sterility and infertility as £7,000,000, and at present prices this figure would be considerably higher. Eighty per cent. of this loss was regarded as preventible. All the same, various workers have estimated the wastage in dairy herds due to breeding troubles as being from 20 per cent. to 30 per cent. of the total number of disposals.

Generally speaking, the commonest type of infertility in the cow or heifer is represented by the animal which is mated regularly at three-weekly intervals with no pregnancy intervening. In some such subjects, pathological changes, *e.g.*, metritis following a retained placenta, pyometra (Rowson and Spriggs, 1942), gross genital indurations and ovarian bursitis (Spriggs, 1945), may be diagnosed by the veterinary clinician. In other cows, malnutrition or a faulty bull may be incriminated aetiologically. In the majority of animals, however, often encountered in the best-managed farms, no abnormality can be detected clinically after a detailed rectal and vaginal exploration has been carried out by an experienced examiner (Sterility Officers' Meeting, 1944).

The causes of this so-called physiological or functional sterility are varied. It is probable that the national campaign for increased winter milk production has accentuated its incidence by encouraging farmers to serve their heifers in the winter months, a season which has the lowest fertility rate in nature. The quantitative and qualitative deficiencies in war-time diets are undoubtedly antagonistic to 100 per cent. breeding success. The modern mammary development of the dairy cow, with the agriculturalist's endeavour to extract the last pound of milk and butter fat from her, in all probability acts as a deterrent against the physiological functioning of the endocrine system. The concentration of the breeder on such factors as colour, shape and size of teats, quantity and quality of milk production, without considering the question of fertility and longevity, is perpetuating and accentuating the no-lesion type of infertility found so frequently in maiden heifers.

Many of these animals successfully become pregnant after a large number of services, either with or without treatment. In order to eliminate the uneconomic period of barrenness, it would be advantageous to induce an artificial lactation in such heifers and similarly in dry cows for an interim period until the lost fertility was restored. Such an endeavour may be made by the subcutaneous administration of oestrogens. This method has been employed in 19 animals and the results are given later. The coincident changes occurring as a result of the experimental procedure will also be discussed.

REVIEW OF LITERATURE

The latest advances in the lactational endocrinology have recently been reviewed by Folley (1944). From a practical point of view, no effective artificial stimulus to milk secretion was obtained prior to oestrogen therapy and the discovery by Dodds *et al.* (1938) that the cheaply produced synthetic compounds diethylstilboestrol, hexoestrol and dienoestrol possessed a high oestrogenic activity. de Fremery (1938) induced lactation in the goat with anterior pituitary extract following oestrogenic preparation. Folley, Scott-Watson and Bottomley (1940) obtained copious lactation in the same species by inunction of the udder with an ointment containing diethylstilboestrol, and Lewis and Turner (1941) did likewise by daily subcutaneous injections and later by the subcutaneous implantation of solid tablets.

Walker and Stanley (1941) recorded a 14 and 16 lb. daily milk yield in two heifers receiving prolonged injections of diethylstilboestrol either alone or in combination with testosterone propionate. A heifer with pyometra treated by Rowson and Spriggs (1942) gave 2 gallons daily after three injections of the oestrogen, whilst Reece (1943) obtained peak yields of 3 gallons in each of two animals.

Parkes and Glover (1944) tried various esters of diethylstilboestrol by single subcutaneous inoculation either alone or in combination. The highest daily peak yield of 13 lb. was obtained using 250 mg. of the rapid-acting dipropionate together with 250 mg. of the slower-acting dilaurate. Since most of the 24 treated heifers gave almost negligible yields, one cannot agree with the authors' conclusions that "allowing for the small size of the heifers this combination of esters, given as a single injection, seems to induce lactation as effectively as implantation".

Using the subcutaneous implantation method, Folley and Malpress (1944*a*) found that a number of small tablets totalling 5·0 or 2·5 grammes were the most effective. There was no difference in efficiency between diethylstilboestrol and hexoestrol although the former compound was absorbed more quickly. A great drawback was the tablet fragmentation and migration. The best response from 29 animals was a peak of 3 gallons daily and a total lactation of 740 gallons. Individuals implanted with one or two 1 gramme tablets gave a poorer yield on the whole, only three out of ten producing a reasonable secretion. The complete removal of the larger tablets, however, was very much easier. Most of the animals showed nymphomaniacal symptoms, and in 20 per cent. of the experiments in which small tablets were used, this syndrome culminated in pelvic fracture. One out of eleven subsequently became pregnant.

Hammond and Day (1944) have given oestrogen treatment to 140 cows and heifers, mostly using the small tablet implants, and nearly a ton of milk has been produced on the average per animal. Lactation has not always resulted but many animals have given commercial yields including several of over 900 gallons. In some of the poorly responding beasts an injection of stilboestrol dipropionate was given at the time of tablet removal but no additional secretion was achieved in most cases. During treatment, follicle growth in the ovaries ceased until after tablet removal although occasionally a corpus luteum persisted. The oestrous cycle was irregular and a few subjects showed characteristic male behaviour. Relaxation of the pelvic ligaments has sometimes led to pelvic fracture.

In 22 of Hammond and Day's animals, the oestrogen was inserted intraperitoneally. Although absorption was apparently much more rapid by this method, the milk yields were on the average lower and only one heifer subsequently conceived. The unpleasant sequelae, *e.g.*, raising of the tail-head, continual oestrus, and lowered general condition, were just as marked in such animals and one was unable to alleviate these symptoms by tablet removal. Subcutaneous injections in three animals gave a very poor milk secretion. The results in all three groups were somewhat poorer in the dry cows than in the maiden heifers whilst lactating pluripara were dried off.

Folley and Malpress (1944*b*) incorporated 50 or 200 mg. diethylstilboestrol or dienoestrol in the dairy cake and fed it daily to 32 heifers for a number of weeks. The milk response was bad, only 19 being brought into lactation at all. In these, the yield was most variable and only four animals produced a reasonable amount of milk. Nymphomaniacal symptoms were not marked and the general body condition was unimpaired. Two hopeless cases of vaginal prolapse were induced. The subsequent fertility record of the 30 remaining heifers was very good (personal observation). Thirteen single calves of each sex were born, two heifers were slaughtered whilst pregnant (one of which carried twins) and two were discarded as barren. The authors estimated that only 10 per cent. of orally administered oestrogen is utilised and that this factor constitutes a most serious disadvantage to the method on economic grounds.

The quality of the milk produced from oestrogenised cattle has been studied by several workers (Folley and Malpress, 1944*c*; Hammond and Day, 1944). Such animals commenced by secreting a colostral fluid similar to that found in the post-parturient cow and very variable in chemical composition. Provided a daily yield of a few lb. was reached, the consistency changed within a few days to that of normal milk. Qualitative estimations revealed that on the whole the milk was above the average in solids content and that this richness persisted through the whole lactation. The solids-not-fat figure tended to be high, and the butter-fat percentage, although erratic, was mostly well above the legal minimum. Lawson, Stroud and Williams (1944) have shown that no appreciable amounts of oestrogens are secreted in the milk of treated animals.

EXPERIMENTAL MATERIAL

The 19 experimental animals are listed in Table I. They were kept on various farms in Southern England, all being privately owned. Not more than two animals were treated on any one farm and the individuals represent the products of varying herd managements.

The total comprised 13 heifers and six dry cows. Two of the former had "white heifer disease" (D and R) and conception was physically impossible. The remaining eleven (E, F, G, H, M, N, P, T, U, V and X) were all chronically infertile heifers, which had been served on the average six times each; many had also been running with the bull. The majority had shown more or less regular oestrus, but G had been in anoestrus for a long period. The genitalia were clinically normal to a detailed rectal examination in all cases.

The six cows were of varied type. K, L and W had calved normally and had been dry for nine, nine and 1 months respectively. Q and S had aborted and been dry for six and four weeks respectively, whilst J had aborted ten months previously and the milk secretion being low the udder was left entirely alone. K and S had not been served, whilst the other four animals had been to the bull an average of six times each. In this group, likewise, no abnormality could be detected in the genital tract.

The general condition of the animals was good and no individual was accepted for treatment which showed obvious malnutrition. For their respective breeds, see Table I. They comprised six Shorthorns, four Jerseys, seven Guernseys and two British Friesians.

The age of the heifers was two to five years old with an average of about three years. Thus, on the whole, they were the better bred animals, which had been kept on the farm for a long period in view of their potential value when in-calf. Moreover, most of them lived on milk-recorded farms. The dairy quality, as judged by the milk and butter-fat records of the sire and dam and by the

individual's general conformation, was fairly high. These criteria have been used to differentiate the "good" from the "fair" heifer in Table I.

The owners were instructed to give an extra ration of concentrates to implanted heifers. This was usually carried out during the first few weeks but after that, such foods being generally in short supply, the animal had to exist as much as possible on natura grazing, which at times was very poor. The nutritional shortage undoubtedly lessened the response in some animals. A rise in milk yield was frequently noticeable when the animal was first put out to grass or when a new pasture was grazed. It was recommended that the individual be kept in a loose-box on her own during the time the implant was *in situ* and for three weeks afterwards, but this rule had often of necessity to be relaxed after the first six weeks of treatment.

ture for two days and weighed. It is realised that this method is open to criticism, but it gives the approximate absorption rates and the results are comparable to one another.

Instructions were given to the cowman to start milking 12 days following implantation and when a daily yield of 5 lb. was reached to commence twice daily milking.

RESULTS

Lactation

The lactation curves of all those animals giving a reasonable quantity of milk are presented in Figs. 1 to 3, and the total and maximum yields in Table I. The results support Folley and Malpress' (1944a) and Hammond and Day's (1944) findings of extreme variability in response, and it is impossible to draw any very definite conclusions. Nevertheless, a brief analysis of the respective yields will be advantageous.

Table I.—Details of Individual Animals, Milk Yield and Fertility

Animal	Breed and Condition before Treatment	Dairy Quality	Daily Milk-yield During Peak Week (lb.)	Duration of Lactation (days)	Total Yield (lb.)	Subsequent History	No. of Subsequent Services
D	Shorthorn with white heifer disease	Good	0	—	0	Slaughtered	—
E	Infertile Jersey heifer	Good	28	435*	7,053	Aborted at 3 months	1
F	Infertile Shorthorn heifer	Good	26	365*	5,174	Non-pregnant	5
G	Infertile Guernsey heifer	Fair	15	273	2,893	No oestrus. Non-pregnant	—
H	Infertile Shorthorn heifer	Good	30	365*	6,649	Non-pregnant	5
J	Infertile British Friesian first-calver	Good	30	301*	6,484	Pregnant	2
K	Normal Guernsey first-calver	Fair	27	287	2,871	Pregnant	1
L	Infertile Guernsey cow	Fair	9	287	1,798	Non-pregnant	2
M	Infertile Shorthorn heifer	Fair	4	42	14	Slaughtered	—
N	Infertile British Friesian heifer	Good	24	287	4,557	Pregnant	2
P	Infertile Shorthorn heifer	Fair	30	333*	4,731	Non-pregnant	2
Q	Infertile Jersey cow	Fair	0	—	0	Slaughtered	—
R	Shorthorn with white heifer disease	Fair	4	83	115	Slaughtered	—
S	Infertile Guernsey cow	Fair	0	—	0	Slaughtered	—
T	Infertile Guernsey heifer	Fair	24	266	4,156	Non-pregnant. Cystic ovaries	3
U	Infertile Guernsey heifer	Fair	22	266*	3,981	Non-pregnant. Cystic ovaries	2
V	Infertile Jersey heifer	Fair	20	280	3,620	Non-pregnant	6
W	Infertile Guernsey cow	Fair	21	210*	3,094	Non-pregnant	4
X	Infertile Jersey heifer	Fair	0	—	0	Non-pregnant	1

* Denotes that animal is still lactating

Technique and Substances Used

The oestrogens employed were diethylstilboestrol (hereinafter referred to as stilboestrol) and hexoestrol. The stilboestrol tablets weighed 50 mg. and contained 1 per cent. stearic acid. The hexoestrol tablets weighed 1,000, 250 and 25 mg. and contained no excipient. Table II shows the numbers of tablets employed. It will be seen that animals D to G received a total dosage of 4 grammes, H to Q 2·5 grammes, R to W 2 grammes, and X 3 grammes. The tablets were disc-shaped, with a flat top and bottom in the larger two sizes, and convex surfaces in the smaller ones.

A vertical incision 1½ inch long was made in the skin. The forefinger was inserted through it and thrust downwards to form a subcutaneous pocket 2 inches long. The small tablets had previously been placed and weighed in a thin glass tube. The latter was inserted into the pocket and the tablets quickly tapped out. Two sutures of No. 4 silk were inserted in the skin wound.

In the case of the 1-gramme tablets, two subcutaneous pockets in different directions led to the deposition of individual tablets about 3 inches from each other.

The tablets were removed from the animal after a varying period of time. In the enucleation of a group of the smaller tablets, a vertical incision of 2 to 4 inches was made directly over their site, which could be readily recognised by digital palpation as a small bulge under the skin. Great care was taken not to penetrate the fibrous capsule surrounding the tablets. The mass was then dissected out in its entirety. In most instances the tablets were all clumped together but sometimes there were one or two subcentres adjacent to the main group, and these had to be removed separately. If the oestrogen had been placed too deep, complete excision was made more difficult. Occasionally, an odd tablet was found encapsulated near the original incision.

In the case of the 1 gramme tablets, individual removal of each one was necessary. A small incision was made over the site of the embedded tablet and its fibrous capsule picked up with forceps; the capsule was then opened and the tablet removed with blunt-ended forceps. This procedure eliminates the risk of the capsule becoming chipped during enucleation. The skin was sutured as before.

Only in one heifer was there any appreciable inflammatory swelling following implantation, but in two other animals excision of the tablets was not accompanied by first intention healing. All these incidents responded quickly to local treatment and in no case was extrusion or extensive scattering of the tablets observed.

Cleansing of the tablets was done by shaking in water and wiping off the foreign material. They were left to dry at room tempera-

A comparison of the efficiency of stilboestrol and hexoestrol cannot be made owing to the different dosages of the two substances being used. The general variations, however, between individual animals are common to all dosage groups and the one compound does not seem to be better or worse than the other.

The average total lactational yield in the fifty 50 mg. group is 667 gallons, in the eighty 50 mg. group is 378 gallons, in the two 1 gramme group is 391 gallons, in the hundred 25 mg. group is 233 gallons, and in the other two small classes the yield is negligible. If one omits the white heifer D, which did not lactate at all, the responses of all those animals receiving the 50 mg. tablets are decidedly better than the other groups and they include the four highest-yielding animals (E, F, H and J). Some animals (marked with an asterisk in Table I) are still lactating but are due to be dried off shortly. The results indicate that 50 tablets of the 50 mg. size, amounting to 2·5 grammes of oestrogen, is a sufficient dosage to procure adequate lactation. Four out of the six animals in the hundred 25 mg. group yielded a moderate amount of milk, but this dosage can hardly be recommended in view of the greater difficulty in the removal of the tablets.

As can be seen in the graphs on Figs. 1 to 3, great variability was registered in the rapidity of onset of lactation. Folley and Malpress' (1944a) animals generally reached a peak yield at the five to ten week post-implantation period, whilst Hammond and Day (1944) record a rather more delayed maximum yield. A high yield was consistently reached within ten weeks in those animals represented in Fig. 3, although there was a slight rise after that; this latter rise was undoubtedly due to nutritional factors as these animals were all treated in the early spring. The remainder of the animals were implanted during the winter and showed, on the whole, a more gradual increase, reaching a peak at about five months, soon after the lush April grass had appeared. This nutritional factor tended to have a secondary effect of prolonging the length of lactation, three heifers (E, F and H) having now been in milk for over a year, which is considerably longer than the time noted by Folley and Malpress (1944a).

The same workers point out that leaving the tablets *in situ* for too long a period may have an inhibitory effect on milk secretion. With the periods chosen in the present series of animals, however, no rapid rise or fall in milk production followed the removal of the tablets, in spite of a variation in the length of treatment of 45 to 156 days. One can merely note that the existing trend was maintained in those individuals showing an ascending milk yield. The seasonal and nutritional effects are considered to be of more paramount importance than the actual time of tablet removal,

FIG. 1

MEAN DAILY MILK YIELD FOR WEEKLY PERIODS FOLLOWING IMPLANTATION WITH 80 X 50mg. OR 50 X 50mg. TABLETS OF DIETHYLSTILBŒSTROL

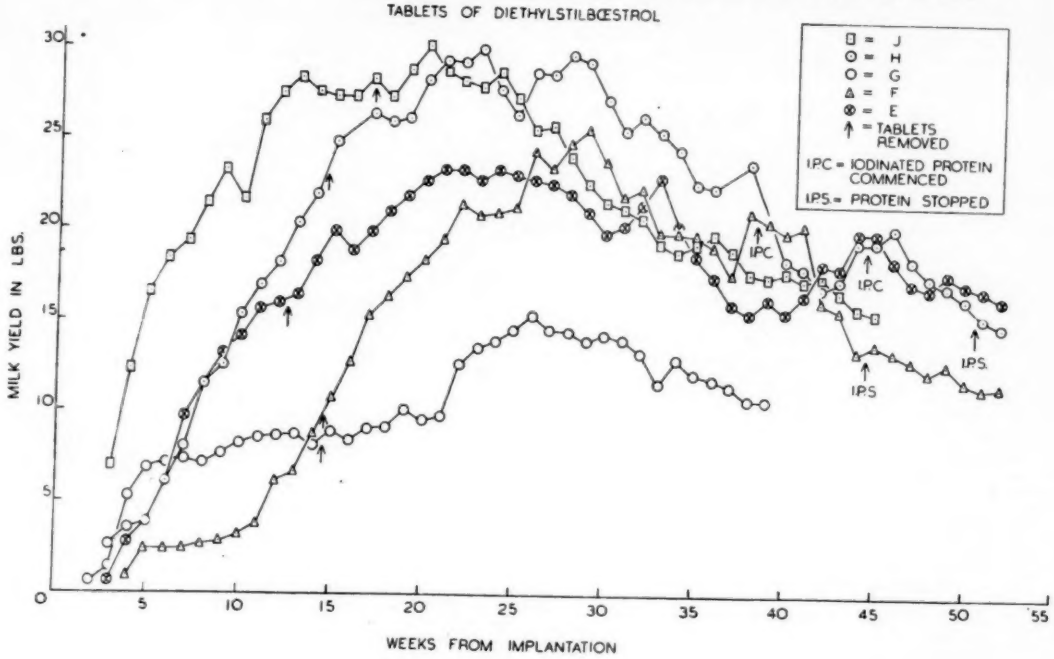


FIG. 2.

MEAN DAILY MILK YIELDS FOR WEEKLY PERIODS FOLLOWING IMPLANTATION WITH 100 X 25mg. TABLETS OF HEXŒSTROL

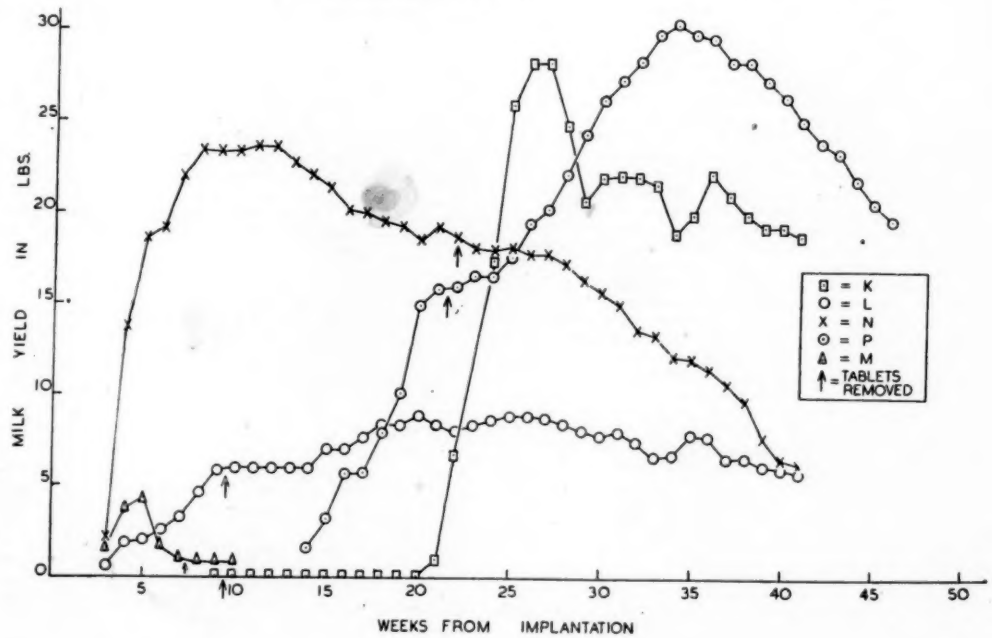
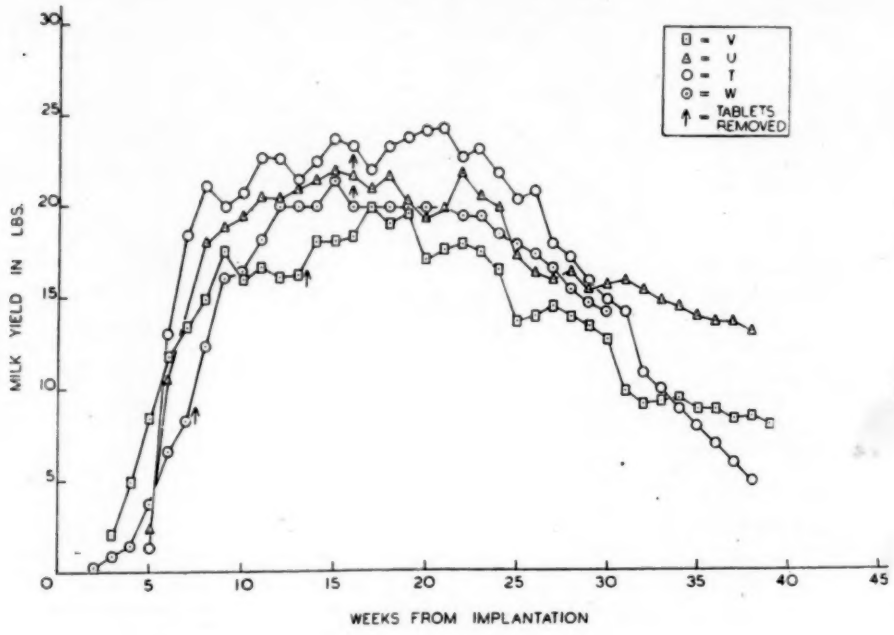


FIG 3

MEAN DAILY MILK YIELD FOR WEEKLY PERIODS FOLLOWING IMPLANTATION WITH 2 X 1 gm. TABLETS OF DIETHYLSTILBŒSTROL



provided this is not too long delayed. For other reasons, mentioned later, it is not desirable to leave the oestrogen *in vivo* for longer than is necessary, and the author agrees with Hammond and Day (1944) that, if lactation has commenced, excision should be performed within 60 days.

A strange phenomenon was the delayed response of animals P and K at 15 and 21 weeks respectively. This type of occurrence is quite unusual and not readily explainable, and it is conceivable that some of the other apparent failures may have developed a similar retarded milk flow if they had been retained. A disappointment was registered by heifer M, which started lactating normally but suddenly ceased after three weeks.

Some growth of the mammary gland was noted in all treated heifers whether they lactated or not. Animal D, for instance, was refused acceptance for slaughter at the collecting centre until the graders were persuaded that she was not pregnant.

The mammary secretion commenced as a sticky, honey-like or watery fluid, which rapidly developed a colostral appearance, normal milk being secreted in a few days. In heifers F and H, the milk was slightly blood-tinged for a few days after removal of the tablets, similar to that seen in a freshly calved heifer.

Comparing the yields of cows with those of heifers, the results are in accord with Hammond and Day's (1944) finding that pluripara and primipara were less responsive to oestrogen therapy. The best yield was obtained from J, an animal which had aborted her first calf ten months previously and had never been milked. Mammary development was already present and she attained a daily maximum of 3 gallons before becoming pregnant again. Moderate yields were given by cows W and K whilst Q and S completely failed to secrete at all. The response bore no relationship to the length of the dry period.

Judging the milk production according to the quality of the animal from a dairying standpoint, the results are significant. All those animals having an excellent conformation of the body and udder together with a high milking pedigree were classed as "good." (See Table I.) In all these animals, except the two with "white heifer disease," an economic milk output was obtained. The above criteria, together with the yield of a previous lactation in the case of a cow, should be taken into consideration before deciding whether an animal is a fit subject for implantation.

A subcutaneous injection of stilboestrol dipropionate (200 mg.) was given to animals M, P and S at the time of tablet excision in a further endeavour to stimulate milk secretion. This procedure was entirely without effect.

A corpus luteum was manually removed from the ovary in two animals a few weeks after tablet removal with the same intention and negative result. This operation, performed at the time of implantation, did not apparently influence the onset of lactation.

Heifers F and H were half-sisters on the same farm and underwent identical treatment and management. The variation in their lactation curves is interesting.

Blaxter (1943) has shown that iodinated proteins, by simulating the action of thyroxine, accelerate metabolism and have a powerful galactopoietic effect in cattle. In conjunction with this worker, it was decided to try its effect on the two oestrogenised heifers, F and H. During declining lactation, nine months from its onset, F received 20 grammes iodinated casein in 4 lb. dairy cake in addition to her ordinary diet whilst H acted as a control. Six weeks later the treatment was reversed and F became the control animal. No ill-effects, except for slight nervousness and loss of condition, were observed, but the milk output was not greatly affected. (See Fig. 1.) In heifer H, the yield had gone up the week before the onset of this additional treatment, due to a change of pasture, and this increase was maintained for a few weeks. A subsequent drop in milk production was, however, surprisingly checked on the cessation of iodoprotein intake. There was no appreciable change in the lactation of heifer F.

Many owners of implanted animals remarked on the excellent colour of the milk. Estimations of butter-fat and total solids-not-fat were made on eight occasions at varying stages of the lactation. Whilst the values of the former tended to be somewhat erratic, percentages of both constituents were generally high and confirmed the rich-looking appearance. This is in agreement with other authors (Hammond and Day, 1944; Folley and Malpress, 1944c.)

Tablet Absorption

The estimated daily absorptions from the implants are given in Table II. The values from the small tablets are estimated according to Folley and Malpress' (1944a) method—by counting the number of recovered undamaged tablets, weighing them when dry, and calculating the total residual weight on the assumption that each tablet undergoes equal absorption. No allowance was made for ghost formation (Folley, 1942). The approximate daily absorption figures obtained are somewhat lower than those of the above authors.

TABLE II.—OESTROGEN ABSORPTION DATA

Animal	Tablets No.	Tablets Weight (mg.)	Sub-stance	Total Weight (gms.)	Duration of implantation (days)	Percentage Tablets recovered. How situated	Estimated Daily Absorption Mg. per Day	Mean
D	80	50	Sb	4·0	77	94 In 2 foci	8·8	
E	80	50	Sb	4·0	80	100 Together	6·4	7·8
F	80	50	Sb	4·0	90	97 In 2 foci	10·3	
G	80	50	Sb	4·0	94	100 Together	5·6	
H	50	50	Sb	2·5	90	98 Together	4·9	4·0
I	50	50	Sb	2·5	115	100 Together	3·0	
K	100	25	Hx	2·5	65	89 In several foci	6·2	
L	100	25	Hx	2·5	65	95 In 2 foci	6·2	
M	100	25	Hx	2·5	53	92 In several foci	4·9	6·0
N	100	25	Hx	2·5	154	86 Together	4·0	
P	100	25	Hx	2·5	156	90 Scattered	8·5	
Q	100	25	Hx	2·5	109	—	—	
R	8	250	Hx	2·0	109	100 Together	3·6	3·6
S	8	*250	Hx	2·0	124	—	—	
T	2	1,000	Hx	2·0	100	100	2·1	
U	2	1,000	Hx	2·0	100	100	1·9	
V	2	1,000	Hx	2·0	98	100	1·7	2·2
W	2	1,000	Hx	2·0	56	100	3·0	
X	3	1,000	Hx	3·0	45	100	2·5	2·5

Sb denotes diethylstilboestrol. Hx denotes hexoestrol.

It will be seen that the absorption rates tended to vary with the extent of diffusion under the skin. Thus those extracted in one mass showed the lowest absorption rates whilst those animals in which the tablets had accumulated in two or more pockets showed a higher plane of assimilation; this is no doubt due to the increased effective surface area of the implant. No case of complete absorption, as observed by Day and Hammond (1944) was experienced.

To a certain extent, the longer the tablets were *in situ* the smaller the daily absorption. Speaking generally, the total absorption from a given weight of implant varied inversely with the size of the tablets. The mean daily absorption from two 1 gramme tablets was 2·2 mg., and this gave a moderately good milk yield. The daily absorption of 4 mg. given by the fifty 50 mg. group gave the optimum yields. It may be deduced, therefore, on the available evidence, that a daily absorption of approximately 4 mg. is sufficient for an economic lactation but that this will probably not be attained by the implantation of two 1 gramme tablets.

This point leads us to discussion on the relative ease with which the different-sized tablets are removed. For practical purposes, one can immediately condemn the use of 25 mg. or smaller tablets. In only one animal did the whole implant remain localised in a single mass and 100 per cent. recovery of the tablets was never obtained. Moreover, the remaining oestrogen would probably have some transient inhibitory effect upon lactation and fertility, and it has been shown that the required initial dosage can be reached using larger tablets.

The evidence concerning the 250 mg. tablets is scanty, but it would appear that there is no advantage of this size over the larger or smaller ones.

From the operator's standpoint, the real comparison lies between the 50 mg. and 1 gramme sizes. In the dosages used in this series of experiments, the galactopoietic response has been slightly greater when the 50 mg. tablet was used (with a greater rate of absorption), although in the cattle receiving the 1 gramme size, the lactation has been more uniform. The result suggests that if the large tablets are used a greater number (four or five) should be implanted for optimum milk secretion. They could probably all be inserted through the same incision, thus greatly facilitating operation, and pushed in different directions subcutaneously for about 3 inches, thus ensuring maximum oestrogen utilisation.

The removal of these 1 gramme tablets would necessitate a separate incision for each. Let us compare this operation with the complete excision of one, or possibly two, pockets of 50 mg. tablets. The latter procedure is normally quite easy, unless breaking and scattering of the tablets has occurred. Table II indicates that the total amount of oestrogen was recovered from three animals with only a small loss from the other three.

To facilitate removal, the recommendation is made that implantation is not carried out too deeply in the subcutaneous tissue and that the tablets are deposited as quickly and neatly as possible in one focus. This method was employed in most of the individuals here described, with good results. It might be supposed that too much superficiality in tablet deposition would predispose to their subcutaneous fracture, but if the posterior shoulder region is used this risk is largely overcome. A disadvantage of the location is that the heifer can lick the operation site but this factor can be eliminated by tying up the heifer for a few days after incision and excision.

Changes in the Genitalia

As recorded by other workers, the most constant and striking change noted after implantation was the complete cessation of the ovarian cycle. Within two to three weeks of the operation, the ovaries had become small and smooth with no trace of follicular or luteal growth detected *per rectum*. The author has observed this anoestral phase in oestrogenised cattle, whatever mode of administration is employed, provided the dosage is sufficient. (See Folley and Malpress, 1944b; Parkes and Glover, 1944.)

The cow S showed the presence of a corpus luteum 22 days after implantation. This was probably a persistent one but its removal had no effect on the non-appearance of milk secretion. The right ovary of heifer D contained a persistent corpus luteum at slaughter 77 days after operation, but it was too small to remove manually *in vivo*. It might conceivably have been a factor preventing lactation, as suggested by Hammond and Day (1944).

Following excision of the tablets, oestrous rhythm was restored in fortunate cases within a month. A disconcerting feature of the whole experiment, however, was the length of time that most animals took in settling down to normal sexual behaviour. For instance, heifers F and H did not show a regular three-weekly cycle for over six months. An ovarian cyst was ruptured in H six weeks after tablet removal and thereafter a corpus luteum was detected in one or other ovary of both animals at every subsequent examination. The inter-ovulation periods were too short, remaining at 10 to 17 days. It is not surprising that a total of eight inseminations were unsuccessful during this time. The erratic manifestation of oestrus was of frequent occurrence in the early post-removal phase but a regular oestrous rhythm and normal sexual behaviour often supervened within a few weeks.

Heifer E showed cystic formation in the ovaries for three months after tablet excision in conjunction with an excitable temperament. Heifers T and U each had three ovarian cysts five months after removal of the tablets. They commenced to come into season fairly frequently and had been served and assumed to be six weeks' pregnant until diagnosed otherwise. This combination of morbid sexual behaviour, interspersed with periods of clinical anoestrus, was characteristic of some implanted and post-implanted animals. Heifer G, for instance, was very lively for a few weeks after taking the tablets although she never showed true oestrus, with acceptance of the bull, up to the time of her slaughter seven months later. The ovaries were in cystic phase for three months and then became perfectly quiescent; although no signs of follicular or luteal development were palpable, the ovaries were somewhat enlarged, probably as a result of the prior cyst formation. There was no possibility of any implanted oestrogen having remained in the animal since 100 per cent. of the tablets were recovered in their entirety. This heifer, however, had manifested long periods of clinical anoestrus before operation and her subsequent erratic behaviour may partially have been associated with this fact.

Alterations in the uterus were noted in all implanted heifers during the later stages of treatment and for a few weeks afterwards. These changes comprised a general flaccidity or lack of tone of the uterine cornua associated with their slight enlargement. The cervix dilated a little, allowing the discharge of a clear mucoid or thin pus-like fluid, usually sterile on aerobic culture. These changes were in no case serious. They are worthy of mention, however, from the veterinary clinician's standpoint, as a possible means of combating infertility associated with under-development or hypoplasia of the genital tract.

Conformation and Behaviour

The erratic temperament of the anjmal for an indefinite period after tablet removal was mentioned in connection with the ovarian changes. The behaviour during the actual time of implantation has shown great diversity and largely conforms to Hammond and Day's (1944) description. The general term "nymphomania" does not quite interpret the variety of mannerisms manifested although, generally speaking, excessive sexual activity was observed.

Since all the animals were confined to a loose-box for at least the first month of treatment, it was not easy to recognise their "bulling" inclinations. Half of them were comparatively normal in their behaviour and evoked no comments from the herdsman. Several individuals became wilder and more excitable than pre-

viously with extreme nervousness on being handled. On the whole, however, the main inconvenience was in isolating the treated animal from the rest of the herd for several months, particularly in the summer time, when little dry food was available. This separation, accentuated perhaps by the morbid oestrous tendency, may have caused a certain amount of restlessness in itself.

The animals were turned out to grass before, or soon after, removal of the tablets. High-spiritedness was frequently manifested at this juncture. In most instances the liveliness was largely due to the newly won freedom and disappeared in a few hours, but two animals had to be isolated for a few more weeks.

On becoming accustomed to their new surroundings, the rather frequent oestrous manifestations remained for a short period. Very often these symptoms comprised the detection and mounting of other members of the herd in oestrus and yet refusal to be served by the bull. In other heifers, mating was performed readily at times when ovarian examination showed conception to be impossible. Several animals remained perfectly quiet throughout or showed infrequent oestrous behaviour.

A further symptom associated with the nymphomaniacal behaviour was the relaxation of the pelvic ligaments with the attendant elevation of the tail-head and lowering of the coxal tubers. The incidence recorded by Folley and Malpress (1944a) was not encountered. These authors observed it in all their cases except one or two which were stall-fed or pastured by themselves, whereas only four out of the 19 animals in the present series showed marked raising of the tail-head; several more were slightly affected. This low number is probably due to the isolation of the patients during the commencement of the treatment. As pointed out by Hammond and Day (1944), the above changes are reversed following removal of the tablets and the pelvic morphology becomes almost normal. Contrary to the observations of these workers, this has occurred even when the ovaries have remained cystic.

Associated with the above changes, Folley and Malpress (1944a) reported a 20 per cent. incidence of pelvic fractures in animals which received the small tablets whilst Hammond and Day (1944) recorded five out of 48 patients to be similarly injured. The fracture usually occurred across the shaft of the ilium or else the wing of the ilium became knocked down producing a "dropped hip." Healing took place in most animals after a temporary period of lameness.

In the present series, only one animal (K) showed clinical signs of pelvic fracture. This cow possessed a peculiar conformation of the pelvic region, the base of the tail normally being markedly raised from above the line of the vertebral column. It was, therefore, difficult to appreciate whether there had been much accentuation of this morphology following oestrogen therapy. At service, four months after excision of the tablets, the hind legs of this animal suddenly diverged and a chronic lameness ensued. The milk yield decreased and she walked stiffly on the hind legs subsequently. Although no palpable irregularity could be detected *per rectum*, it is probable that some form of fracture had occurred.

The low incidence of fractures is probably due to the segregation of animals during treatment. Not only does this policy of isolation diminish any nymphomaniacal symptoms but it also lessens the possibility of bone injuries through over-excitement and continuous "riding" of other animals.

In one fractured cow reported by Cowie (1944), no symptoms were observed during life, so it is probable that slight affections of the pelvic bones may pass unnoticed. This author suggested that persistent coital mimicry was responsible for the fractures, with the changes in pelvic morphology as a probable predisposing factor. The present writer agrees with this contention, and the finding of a normal calcium content in the blood of three treated heifers, together with Cowie's evidence of no bone rarefaction, indicates that calcium metabolism is unimpaired.

A final concomitant symptom associated with implantation concerns the general body condition. Hammond and Day (1944) refer to a frequent loss of condition in the first weeks of treatment. This feature has been observed in a few of the 19 animals here described. In most cases the tendency has been more than counteracted by the increased nitrogenous ration advocated. After removal of the oestrogen the animals have put on flesh and their condition has compared very favourably with the other members of the herd. In some instances, where adequate food has been available, the heifer has been almost fit for the butcher at the end of the experimental period. It would appear that the emaciation is closely associated with the nymphomaniac behaviour and that if the latter can be lessened by appropriate isolation, any loss of condition will be inconsiderable.

Fertility

For implantation to become an economic success, it is imperative that the fertility rate following treatment is high. The great majority of Hammond and Day's (1944) subjects were clinically normal heifers which had repeatedly "turned" to the bull. Out of the total of 140 animals, 59 were subsequently mated with an aggregate of 160 services; 17 calved down normally (two of them twice), six aborted, and eleven were diagnosed as being in-calf. This gives an incidence of ensuing pregnancies of about one in four treated animals, with an average of 4·7 services required for each, and a decidedly high ante-natal mortality rate. That the fertility rate in nullipara was considerably higher than that in older cattle is indicated by the figures of 32 pregnancies out of 115 treated heifers and only two pregnancies out of 32 treated cows. The authors conclude that their results "do not show treatment impair fertility or even that it is not beneficial." Folley and Malpress' (1944a) results were very disappointing. They recorded one heifer pregnant amongst nine heifers and two cows.

Reference to Table I indicates that of the 19 animals here described, subsequent nidation took place in only four. Omitting the absolute sterility of the two white heifers D and R, this gives a fertility rate of four in 17 or 24 per cent., including at least one abortion in the four animals. If one excludes cases M and N, in which the lactogenic response was negligible, 15 animals were served a total of 36 times, giving an overall conception rate of 9·0. It should be stressed that though some animals are still lactating they have all had an adequate period of time in which to settle down in calf. Cow K had not been served at all before treatment. The only really successful subjects, therefore, from the economic standpoint, were the Friesians J and N. These individuals had had five and 12 fruitless services respectively before treatment and both conceived to the second coition afterwards. It may be concluded that the fertility rate following implantation is not high and is comparable to the fertility to be expected in the absence of such treatment.

DISCUSSION

It has been indicated in the present experiments that a copious lactation may be initiated in a proportion of maiden heifers and dry cows under farm conditions by the subcutaneous implantation of solid tablets of synthetic oestrogens. It is also evident, however, that the procedure is not applicable on a widespread scale.

There are various disadvantages to the operation, not the least of which is the extreme variability of individual lactational response. This diversity was not associated to any great extent with the age of the animal, the degree of mammary development beforehand or the dosage and duration of the implant. There was, however, limited evidence that cows and heifers of good dairy quality and performance gave better milk yields and that nutritional and seasonal influences were an important consideration.

The possible hormonal mechanisms responsible for the individual variabilities constitute a separate problem and it is not intended to discuss them here. Attempts to modify the course of artificially induced lactation, using other hormone preparations, have met with only moderate success. Certain anterior pituitary extracts have been effective on occasion but their scarcity and cost entirely precludes their use in the field on economic grounds. There is, however, active research work in progress on this aspect of the subject, and it is to be hoped that the near future will provide considerable advances in our knowledge.

A comparison of the relative merits of large and small oestrogen tablets for general use has shown that an economic lactation can be induced by the employment of fifty 50 mg. stilboestrol tablets, and it would seem that this dosage is a convenient one for practical application. If they are introduced quickly, compactly and not too deeply, into a subcutaneous pocket behind the shoulder, well away from the site of the incision, their subsequent removal should not be difficult. It is possible that in the occasional highly nervous heifer some breaking and scattering of the tablets may occur but the risk is not great when the heifer has the run of a spacious loose-box or stable.

The limited evidence supports Folley and Malpress' (1944a) contention that four 1,000 mg. tablets of hexoestrol would probably supply the requisite absorption. The risk of nymphomania may be greatly diminished by the stabling or tethering of the animal in isolation, and by leaving the tablets *in situ* for as short a period as possible—a maximum of 60 days is suggested. Farm routine is upset less and breeding prospects will be greater.

The animal may be served when the oestral rhythm has been restored to its normal periodicity. Heifers showing a poor lactogenic response and having three ineffective services after implantation should be fattened off without delay. Where only a moderate yield is elicited, the animal may be usefully employed for rearing calves. Two heifers, in which this policy was carried out, showed no disinclination to nurse their adopted offspring.

Bearing in mind the above limitations, the author considers it a judicious and a practical proposition to implant certain individually selected animals—especially heifers. For qualification, such

animals should be in reasonably good condition, of excellent dairy type and pedigree, with a history of persistent infertility although clinically normal to a detailed rectal and vaginal examination.

The operation is best performed in January, February or March for the optimum results. This recommendation fits in well with the stockowner's breeding programme. He usually gets his heifers served from November onwards to ensure a maximum milk output during the following winter. Good quality heifers failing to "settle" to the bull by early spring will then be eligible subjects for implantation.

On the basis of the results, implantation is not considered to be an economically sound procedure for permanently sterile heifers, *e.g.*, in "white heifer disease," or in freemartins. Similarly, it is unlikely to be a commendable step in dry cows with poor breeding prospects, *e.g.*, those affected with bilateral ovarian bursitis, salpingitis, perimetritis, long-standing pyometra, uterine indurations, perineal rupture or chronic nymphomania. It might, however, be considered in cows having shown an exceptional response in previous lactations.

A final observation may be made about the farmer's reaction to artificial lactation. Whilst many stockowners have been interested in the procedure on account of its novelty, they have not, as a whole, been impressed with it as a practical proposition. A few have found the additional milk most useful to keep up their contracted supplies but only two owners from 15 farms have asked for a repetition of the operation on another animal. If, however, the process can be shown to restore the impaired fertility in slow-breeding heifers, there will always be a limited demand for its use on high quality pedigree cattle. In our present state of knowledge such an optimistic attitude can hardly be fully justified.

Summary

1. The subcutaneous implantation of synthetic oestrogens, using tablets of varying sizes, has been performed on 13 maiden heifers and six dry cows. The results are given and discussed.

2. The lactational response has been most varied but an economic milk yield has been obtained in ten animals. The individual variation was partly correlated with the dairy quality of the animal. Heifers generally gave a better secretion than cows. Nutritional and seasonal factors influenced the amount and length of lactation.

3. Different dosages of diethylstilboestrol and hexoestrol tablets were employed and their approximate rates of absorption estimated. It is concluded that fifty 50 mg. tablets, implanted for not more than 60 days, is the optimum dosage. Two 1 gramme tablets gave a somewhat smaller milk yield.

4. Certain changes in pelvic morphology, typical of the nymphomaniac condition, were induced by implantation in some animals. In one case a pelvic fracture was suspected. The hypererotic manifestations largely disappeared at the cessation of treatment. They were considerably lessened in intensity by the isolation of the animal.

5. The normal oestrous rhythm was frequently not restored until several months after removal of the tablets. The subsequent fertility rate was rather poor, only four out of 13 animals served becoming pregnant.

6. Practical considerations of the operation for field use are discussed.

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CLINICAL COMMUNICATION

Ovarian Tumour in a Bovine

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The specimen illustrated in the accompanying photograph was brought to me some while ago. It consisted of the genital tract of a six-months-old Friesian heifer. As far as could be ascertained, the heifer appeared perfectly normal until it suddenly collapsed, dying within a few minutes. When opened by the knackerman, the peritoneal cavity was found to be full of blood; death appeared to have been due to fatal haemorrhage from one of the cysts in the ovarian neoplasm. The owner had noticed some mammary development in the animal and on *post-mortem* examination milk was found in the udder.

The specimen was found to weigh 12½ lb., the tumour measuring approximately 15 by 9 by 7 inches. The following report was sent to me by Mr. E. Cotchin, of the Royal Veterinary College, who kindly examined the specimen.

"The structure in the position of the ovary is encapsulated, with a slightly knobbly surface. On cross-section it shows numerous cysts supported by a fair amount of a soft and rather fibrous tissue, which in places contains gritty deposits. The cysts are mostly about 1 to 2 cms. in diameter, but some reach 5 or 10 cms.; they are filled with a rather sticky bloodstained fluid held under some pressure. The structure appears histologically to be a 'granulosa-cell tumour' of the ovary. The uterine mucosa is not well preserved, but in sections some glandular hypertrophy can be made out.

Granulosa-cell tumours of the bovine ovary are generally large structures, roughly spherical in shape, which appear to have some hormone activity. Baumann, R. [(1935) *Wien. tierärztl. Mschr.* **22.** 1935] described six cases in which the tumours appeared to be functionally active, as the uterine mucosa was hypertrophic and there was intense production of mucin. Weyel, W. [(1936) *Dtsch. tierärztl. Wschr.* **44.** 550] found in two of three affected cows (the third was pregnant) that there was evidence of hormone activity in the form of widening of the uterine cavity, with hyperaemia and glandular hypertrophy. The oestrone content of all three tumours was much higher than that of the normal bovine ovary. Kingman, H. E., and Davis, C. L. [(1940) *N. Amer. Vet.* **21.** 42] described a case in a cow which showed secondary sex changes, while Langham, R. F., and Clark, C. F. [(1945) *Amer. J. vet. Res.* **6.** 81] saw a case in a Holstein-Friesian heifer which developed marked symptoms of nymphomania. Harvey, W. F., Dawson, E. K., and Innes, J. R. M. include four cases in calves in a discussion of granulosa-cell tumours in their memoir on "Debatable Tumours in Human and Animal Pathology" (Oliver & Boyd, 1940).

Such tumours of the bovine ovary may not be very uncommon, and may possibly be described under other names in the literature."

Weekly Wisdom

If we cannot agree to work together to feed the world then we cannot agree on anything.—Sir John Boyd Orr, Director-General of the United Nations Food and Agricultural Organisation.

* * * * *

An increase in membership of more than 10,000 during the past three years to a total of 51,316 on October 31st, is announced by the British Medical Association.

ABSTRACTS

[A Study of Bovine Infectious Keratitis. BALDWIN, E. M. (1945.) *Am. J. vet. Res.* **6**. 180-187. (5 refs.).]

The author showed that *Haemophilus bovis*, absent from the eyes of normal cattle, was present in those of infected cattle. Twelve out of 15 calves were infected experimentally by the installation of cultures of this organism into the eye. By similar means recovered animals were shown to be immune after infection though they harboured the infecting organism for several months. Sheep were resistant to the infective agent.

A. W. G.

* * * * *

[Transmission of Blue Tongue and Horse Sickness by Culicoides. DU TOIT, R. M. (1944.) *Onderstepoort, J.* **19**. 7.]

Insects were collected at night by means of a light trap, members of the genus *Culicoides* were selected from the catch and were used for feeding on experimental animals or for the preparation of an emulsion of ground insects for injection.

Three positive infections of sheep with blue tongue and one positive infection of a horse with horse sickness are recorded following intravenous injection of emulsions of *Culicoides* wild-caught during March to May. One sheep developed blue tongue after being bitten by *Culicoides* that had fed ten days previously on an infected sheep. Experiments were performed with negative results in which wild-caught *Culicoides* (March to May) were fed upon sheep and horses in 23 and 15 experiments respectively.

W. M. H.

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[The Boynton Gall Bladder Smear for Diagnosing Hog Cholera. SIPPEL, W. L. (1945.) *Cornell Vet.* **35**. 147-151.]

It is claimed that this method is an aid to the diagnosis of swine fever but does not replace the necessity of knowing the history, symptoms and *post-mortem* findings. A smear is made of a scraping of the mucous membrane of the neck of the gall bladder. This smear is dried in air, fixed with alcohol and stained with eosin-methylene blue. In a positive smear the cell nuclei stain sharply with distinct borders and a pale blue nucleolus. The cytoplasm is granular and inclusion bodies may be present. These features become more pronounced as the case develops. In a negative smear the cells stain indistinctly or not at all, the cytoplasm is stringy and not granular.

W. M. H.

CANINE HYSTERIA

"Canine hysteria—also known to veterinary surgeons as running fits, fright disease, epizootic hysteria, and infectious hysteria—is an ill-defined disease of dogs, the aetiology and treatment of which have long been in dispute," observes the *British Medical Journal* in a recent note, and continues: "The symptoms associated with it are paroxysmal attacks of hyperexcitability, manifested by running, barking, or howling, defective vision and balance, dementia, and sometimes clonic convulsions, during which a heavy mucous saliva is secreted and the animal frequently urinates and defaecates. The affected dogs appear to be indifferent to pain or to attempts to calm them. It is thought that excitement, physical strain and sudden stimuli, such as a sudden noise or flash of light, may precipitate attacks. Heredity has also been thought to be a causal factor. Many authorities believe the disease to be related to defective nutrition. Lack of vitamins A and B_1, of magnesium and of lysine have been suggested as causes, and also a toxic factor or factors in wheat products.

"Wagner and Elvehjem[1] have recently brought forward evidence to show that canine hysteria is dietary in origin. The terms 'epizootic' and 'infectious' to qualify the disease are ill chosen, as there is little evidence that an infectious agent is responsible. Well-fed animals kept alongside affected animals showed no signs of the disease. Wagner and Elvehjem produced the disease in dogs by feeding them on baked dog foods containing wheat gluten flour and on experimental rations containing the same material. Although the proteins in gluten are deficient in lysine, protein and lysine supplements did not prevent the onset of the disease. The fact that hysteria was caused by feeding wheat gluten flour to dogs receiving nutritionally adequate rations suggested there was some toxic factor in the flour, or possibly a deficiency of an essential food factor. It is possible that if the effect of the toxin were not too severe, correction of the deficient food factor might increase the animals' resistance to the supposed toxin. This might explain the curative effects reported in the past of supplements of casein, lysine, vitamin A, and vitamin B_1."

[1] *J. Nutrit.* (1945.) **28**. 431.

IN PARLIAMENT

Artificial Insemination of Livestock

In the House of Commons on Wednesday, November 14th, the Agriculture (Artificial Insemination) Bill—applicable to England and Wales and Scotland—was read a second time and the necessary money resolution was agreed to in committee.

Mr. TOM WILLIAMS, Minister of Agriculture, moved the second reading "after many disappointments and the exercise of a large amount of patience" and continued: "In spite of a good deal of experience of artificial insemination in Russia, the United States, Canada, Denmark and certain other countries, it is still in its experimental stages here. My right hon. Friend the ex-Minister of Agriculture established in 1943 two experimental centres, one at Cambridge and one at Reading, and these, together with six private centres, have, in the meantime, provided us with very valuable information. However, they have also proved that we have still a good deal to learn about this method of breeding. Many problems remain for investigation, and a commercial centre is scarcely the right spot for research into them. The existing centres are more or less preoccupied with the ordinary provision of a constant service to farmers, so that special research centres are required. Clause 1 authorises my right hon. Friend the Secretary of State for Scotland and myself to set up and operate artificial insemination centres, where such experiments can be carried on and, of course, where practical checks can be applied in the light of experience. These research centres will, therefore, provide a limited service to adjoining farmers. Grants can also be made to private bodies or private persons, and I hope these agencies will be extremely useful for investigation into special problems allocated to them by one or other of the research centres. Hitherto we in this country have thought of artificial insemination primarily for cows, but in the United States, as my predecessor well knows, a good deal of work has been carried out on bees. That has been largely due to an attempt to eradicate the foul brood disease and I understand that the experiments so far are quite encouraging. It is thought, therefore—and was thought also by my right hon. Friend the ex-Minister of Agriculture—that this method of upgrading our livestock might be useful for other animals and other classes of stock. Therefore we intend that in all establishments run for the Ministry of Agriculture, livestock generally shall be investigated for this purpose.

"The second main part of the Bill comprises Clauses 2, 3 and 4. As hon. Members will appreciate, the establishment of a centre such as I have in mind calls for quite a large sum of capital expenditure and will take quite a considerable time before it gets into full working order, and there may be heavy losses in the initial stages. Losses will be incurred because there are not too many good bulls in this country, and they are not cheap. Clauses 2 and 3 therefore enable the Secretary of State for Scotland and myself to underwrite approved losses in any accounting year for a period of five years, starting with January 1st, 1945, to March 31st, 1950.

"Also any centre started in the last of the five years can secure cover for its losses during the whole of its first year's working. I hope it will be generally agreed that the underwriting of these losses in the early stages is in the national interest, because, while there can be obvious dangers in artificial insemination, it certainly holds out great promise and should help us to raise the standard of our livestock in this country. Especially should this be so with small herds where it is almost impossible for the small farmer either to have a first-class bull himself, or to secure its services.

"On the other hand, although losses for the first few years are to be underwritten by the Treasury, provision is made so that should profits be made the Exchequer may, later on, partially recoup its expenditure. It is proposed therefore that once a profit is reached, two-thirds of it will be returned to the Treasury, one-third being left with those who are running the centre as a sort of working reserve for the periods after Government assistance has finally passed away. It is generally recognised that the authority to make grants should be confined to centres that are run by producer controlled organisations. With the passing of the 1943 Act, taking control over the use of semen, the intention was to avoid any commercial exploitation of this very delicate operation. Otherwise there were great possibilities of evil. All the various methods of control have been carefully reviewed. Cattle Breed Societies were called into the discussions and representatives of the National Farmers' Union and of the Milk Marketing Board, and scientific experts were also consulted. They recommended and I am sure the House will agree that artificial insemination should be developed as a national service.

"This requires an orderly plan. No sectional interests or commercial firms should be able to participate. That is why, in general, licences will be restricted exclusively to farmer-controlled organisations such as the Milk Marketing Board, the Cattle Breed Societies and farmer co-operative organisations. That guarantees two things:

that the farmers will have a voice in management and that the interests of users generally will be safeguarded. That, I believe, is strictly in accordance with all experience in the United States, where farmer co-operative creamery centres are reported to be the most successful. My Department has established a strong advisory committee on which representative bodies are represented *plus* such technical experts as may be necessary. Similar conditions to this obtain in Scotland. I think that perhaps the most pleasing feature of all is that my predecessor was able to persuade the Milk Marketing Board, representing as they do the vast proportion of milk producers in the country, to play such an important part in this new development. I think this is a fine constructive job, and a natural development of the powers invested in this producer organisation.

"Class 5 enables the Milk Marketing Board to establish a centre in any part of England or Wales, and, I believe, Scotland, to serve not only registered milk producers within the area, but any dairy farmer who may require the service. After all, livestock and livestock products are the mainstay of British agriculture. We must, therefore, endeavour to keep abreast of the times, and to take advantage of any new method of breeding. Particularly we should lose no opportunity of helping the very small man who has played such a noble part in endeavouring to increase the milk supply of this country during the period of food shortage. This artificial insemination idea is bound to create a wide demand for first-class bulls. I think, therefore, it is going to be a great opportunity for breeders, and I hope they will take full advantage of it.

"Parliament has approved the principle of controlled and orderly development of artificial insemination. This Bill, therefore, is the logical consequence to the Act of 1943. I have heard of no opposition to it in this House, and I do not think there can be much opposition outside. There is, however, a case on record where in one large block of offices there are notices indicating the meetings to be held and the subjects to be discussed. One notice was for 'Artificial Insemination.' On another notice board close by was a second notice: 'Scrub Bulls Protest Meeting.' That is almost an inevitable reaction to a Measure of this description. However, I think that there are great possibilities in this method of attempting to improve our livestock, and I hope the House will give a Second Reading as readily as the previous House did earlier in this year."

Mr. W. S. Morrison (a former Minister of Agriculture) welcomed the Bill. The facts seemed to be that the practice of artificial insemination was now fairly well established here and in other countries, and it seemed to him that it was clearly right that the agricultural departments should concern themselves in this matter, and should be able to assist and supervise its practice, and also assist in research into its potentialities. The main purpose behind the Bill was to assist the breeding of good livestock in this country, and in the breeding of good livestock this country had always held a paramount position. Breeders in other parts of the world had often thought it wise to import male animals from this country, to maintain the stamina and purity of their flocks and herds, and in this way a great export trade had grown up in bulls, rams and stallions. That had been a very profitable part of our agricultural industry, and he saw no reason why this great export industry should be damaged by the provisions of the Bill, or the practice it supervised. But the future development of the practice should be watched by the House to see how it was affecting the export of livestock from this country. In so far as the Bill carried on the process of eliminating the scrub bull it was to be welcomed, and he hoped it might be possible to make good strains of stock available to small farmers cheaply enough to make the attraction of the scrub bull diminish to vanishing point.

"Vice of Breeding Animals for Show"

It was obvious that these practices would increase the scope and range of the scientific breeder, but a word of caution was necessary. He was a little sceptical about the balance of good and evil which was sometimes the result of man's interference with natural selection. The fox-terrier of to-day was not the dog he was when he (Mr. Morrison) was a boy, and the collie, perhaps the finest of our four-footed friends, bred as he had been for show purposes, was much inferior to what he was before he got into the hands of breeders for show. Outbreaks of hysteria in high-bred spaniels he thought were due to their being bred for show to an extent beyond the tolerance of nature.

It was true that this vice of breeding animals for show was not entirely absent from horse and cattle breeding, yet he thought the breeders both of horses and cattle had motives of a more sensible character than the mere enumeration of points in the estimate of show judges. The thoroughbred horse in this country had been bred for speed and stamina, and was, of course, probably the finest horse in the world, and our breeders of cattle in the past had concentrated on either milk production or beef production. There was no doubt that the Aberdeen Angus and Shorthorn breeds of to-day were much better than were their progenitors and the British Friesian was a better beast than his ancestors. He sometimes wondered whether, in seeking to attain these ends in milk and beef production, the breeders had given enough attention to the power of the animal to resist disease. "Like all of us cattle live in a world peopled by pathogenic micro-organisms, and what the doctor or the veterinary surgeon can order is no substitute for that mysterious inner defence mechanism which destroys the invading germ in the living animals.

"We are suffering appalling losses every year from animal diseases, as the right hon. Gentleman will agree. Although the strongest steps have been taken, and will no doubt continue to be taken by him, as they were by his predecessors, to strengthen the campaign against disease, tuberculosis, Johne's disease and contagious abortion are exacting an immense toll from the herds year after year. I may be wrong; I speak merely from personal observation which is necessarily limited—but these diseases seem often to attack the most highly bred and civilised animals. The more mongrel breeds seem to be more immune. I wonder if with all our achievements in cattle breeding we have not omitted in the past to give sufficient attention to this aspect of the breeding problem. It is far better, in my judgment, to lose a few gallons of milk, or a few pounds of beef, if, for that price, you can get an animal more robust, more resistant, and more capable of destroying, by the antidotes which its own system engenders, the host of germs and viruses which surround, and plague it."

The right hon. Gentleman had mentioned bees as being included within the scope of the Bill. The bee-keeper was plagued with Isle of Wight disease, and other diseases, and, already, in the breeding of bees, there was a body of knowledge which enabled one to say that some breeds showed more resistance than others. The same was true of poultry; and one knew how potato disease had been most successfully encountered. But with all the spraying in the world and anti-fly measures which could be taken, nothing could show quite as good a resistance as the seed potato, which will stand up for itself in the battle of life. Therefore, while welcoming the Bill, he had ventured to occupy a few minutes in turning the attention of those who were to operate it, to what was perhaps the next great step in the scientific study of breeding, namely, the breeding of animals that could resist disease.

Mr. Dye (Norfolk, South-Western): The records of the herds, from which we choose the animals to be used for the greater amount of breeding in the future, which would arise from artificial insemination, were of the greatest importance. The Bill was of importance not only of itself, but for the part it would play in the great plans that are to be developed for the revival and development of a prosperous British agriculture.

Need for Encouragement of the Veterinary Service

Sir Ralph Glyn (Abingdon) enquired whether further investigation would be made into the radius of effectiveness of these centres. It was very important that this should be a uniform system throughout the country. He understood that in Denmark and in South America the radius that was possible largely exceeded that at present laid down at Shinfield, which was only 15 miles. If the right hon. Gentleman was considering the establishment of other centres, quite obviously, if you could, by research and investigation, increase the range of each of the centres set up, so you would increase the benefits of this Measure for British agriculture.

In regard to the cows that were used, the agricultural research station at Compton, which happened to be within his constituency, had done most valuable work in enquiry into cattle disease, and the superintendent there had been able to prove, he thought, that we had inclined to look upon cows more as milking machines than animals. The more you raised cattle under artificial conditions, which did not give them the hardihood derived from exposure to the elements, the more you reduced their stamina. He hoped that it might be possible for the right hon. Gentleman to consider whether, in most of the milking herds of the country, it would not be a good thing when some cows had reached their final stages, to have their last calving exposed outside, instead of within the protection of some yard. Cows calving in artificial conditions undoubtedly did not have the natural resistance to the elements: they were more susceptible to disease, and the reports of the agricultural research station at Compton, spread over a considerable period, seemed to prove this. It would be unfortunate if this great scheme of artificial insemination were not, apart from the proper selection of bulls, to succeed, owing to the cows used not being such hardy animals as they used to be.

"I think that the veterinary service of the country ought to be encouraged in every possible way," continued Sir Ralph Glyn. "The House realises that the number of veterinary surgeons now in practice is far below what is required for a prosperous agriculture. Unless we are able to encourage young men and women to go into the veterinary profession, it will be very difficult especially with the small man to carry out this scheme, which requires veterinary assistance. I think it ought to be possible for farmers,

who are in a small way, to be able to make an annual contribution for the services of a 'vet.' whenever these are required. Often the small man does not call in a veterinary surgeon quickly enough, because he does not want to pay the fees.

"There was a scheme under the Ministry of Agriculture, I believe, with regard to the examination of dairy herds, based on that principle, with a view to ensuring that expert knowledge should be brought in at the earliest possible moment. I think that is of very great importance for the success of this artificial insemination scheme; and that everything should be done through the Ministry of Education to make known what great opportunities there are, in the field of veterinary surgery, for improving our herds. A very large number of people in the country to-day are determined to improve the stamina and general efficiency of British agriculture, and I am quite certain that what the right hon. Gentleman the Member for Cirencester (Mr. W. S. Morrison) said about resistance to disease is of paramount importance. It is really diagnosis which is necessary. Foot-and-mouth disease has cost this country a large sum, and if we could concentrate as much scientific attention on the elimination of that disease as on improving weapons of war we should have done something to help our country which would have been very much worth while. I feel that the Ministry of Labour Appointments Board and the Ministry of Education might collaborate with the right hon. Gentleman in making known, to parents and others, the great opportunities that are open for first-class veterinary surgeons."

Mr. Paget (Northampton) also welcomed the Bill and referred to the importance of encouraging good breeding on proper co-ordinated lines. With cattle breeding one had to know the pedigree some distance back to know whether you were going to get the desirable characteristics for which you were aiming or whether you were going to get undesirable offshoots, and when the right hon. and learned Member for Cirencester (Mr. W. S. Morrison) spoke, he could not agree with him more as to the desirability of breeding for constitution. You would not get constitution in a fixed sense, so that it would breed true, by breeding mongrels. You must get a pure breed constitution if you were going to reproduce constitution with certainty.

It was on lines of that sort that this problem should be approached. What we wanted first was that the artificial insemination centres should have not merely good bulls but bulls which are drawn from lines of breeding which are common in the district, so that we would be developing distinct lines of breed, and we wanted sequences of bulls coming from those same lines, so that in each district we should be building up a pure line of breeding within the breed. Then we needed to co-ordinate with that the bull licensing system. Frankly, there could not be anything very much more absurd than looking at a bull and saying, "We will license him to be a dairy bull." When you looked at a dairy cow you could see an udder and milk vein and had some clue as to her milking capacity, but when you looked at a bull you had not a clue of any sort, and nobody could say, merely from looking at a bull, whether it was going to get good milkers. And yet that was the primary test for the selection of bulls. Indeed, under the 1931 Act the one important thing, which was breeding, did not come into the matter at all. The only reason why the 1931 Act had worked was because the livestock inspectors had shown a great deal of good sense and had, quite illegally, considered the breeding of bulls. What we wanted was to license bulls, not on their appearance, but according to their pedigree, and to license bulls not generally but for a particular herd, because a bull which might do a great service in one herd would be a menace to another.

With regard to the bull subsidy scheme, we did most urgently need a co-ordinated scheme which was going to build up within the breeds and within the districts pure-bred lines upon which we could rely.

Sir J. Barlow (Eddisbury) said the chief use of artificial insemination was to help the small farmer. It was wholly uneconomical for scrub bulls to be used when, by artificial insemination centres, a very much better type of bull could be at the service of small farmers. By this means, too, the spread of certain diseases could be very much controlled.

Major Wise (King's Lynn) hoped that the other Bills that would have to come to assist agriculture would not be delayed as this one had been. Agriculturists were becoming more scientifically minded, and the time had come when they must decide that stock production must be conducted on scientific lines.

Colonel Corbett (Ludlow): The House accepted the principle of artificial insemination during the last Session. He must confess he looked on the practice with suspicion and saw in it certain dangers. He thought it would be a great danger if we were too readily to extend this practice widely, until we had a great deal more experience of its results.

He had studied the licensing rules drawn up by the Minister of Agriculture for these centres: they seemed to be very adequate and to cover a great many necessary factors. They made provision against disease in the centres, for the staff being properly qualified and for the keeping of records, which was of great importance. But there were one or two points which they did not cover and which he would recommend to the Minister's consideration. It was important that the cost of this service to the consumer—to the man whose cows are to be served by artificial means—should be as low as possible. It was recommended in the Minister's regulations that a minimum of 25s. for service should be the general fee, or £3 for service if you choose your bull. Provision was also made for more expensive bulls and it was recommended that a service from an expensive bull should be at the rate of one per cent. of the cost of the animal. He hoped that the Minister would keep an eye on these costs, so as to provide a service, as liberal as possible, to the poor man and so that this practice was not made a profit-making business. There were dangers in allowing a bull to serve too many cows by this means. The Minister should impose a limit. One hon. Member had said that there was a limit of 15 miles at one centre. He thought that at the centres in Reading and Cambridge there was no limit and semen could be sent all over the country. If you allowed a bull to serve 1,000 cows you would not know what stock he was producing, at any rate for three years—until the cows grew to maturity and came into milk. Perhaps the Minister would consider whether he should not limit all bulls during the first year, until it could be seen what stock was being produced from proven sires. He might make a limit of three years unless the stock was known to be good. There was, of course, the danger of inbreeding from this method, but that was not a very serious matter at present.

There were no regulations in the licensing rules he had seen, which made it illegal to use bulls for crossing. He thought we had sufficient breeds of cattle in this country already. He was not sure how many they were, but he believed there were over 30 and he felt one of the first steps to improve them should be to cut out cross breeding. It had a useful purpose to serve, but, on the whole, he felt it was unnecessary. Most of our bad herds had been produced by indiscriminate crossing.

Mr. Walker (Rossendale) thought we should be very careful in what we did. According to the books and articles he had read, agriculture had suffered very much indeed from scientific interference. If artificial insemination was a good thing we should go ahead, but if it was an evil thing it should be left alone. We could not afford to play tricks with our milk and food supplies.

Colonel Clarke (East Grinstead) said that he had had a scientific training, and he saw no biological reason at all why artificial insemination should have a debilitating effect on stock. Anyhow, it was not going to be universally adopted—not for a long time, anyway—and there would be plenty of opportunity for checking. He had no doubt that veterinary officers would watch it very closely, and personally he had no fears on that score.

It had been said that the fees should range from 25s. for ordinary service to £3 for a bull that was chosen by the farmer. He hoped it would be a good one, because if it was not the scheme would not work as it should. There should not be a tremendous difference between the two. He knew that the man who kept a cheap bull would get certain advantages which might enable him to pay a little more. He would not have to house the bull or feed it, and on that score he thought there would be a certain advantage from the humanitarian point of view, because on small farms very often the bull was the worst treated animal on the farm, ill-housed, seldom exercised and not too well fed. That should be improved and with certain breeds there would be an advantage in not handling the bull, which was very often a source of anxiety. If the scheme was to be a success it must meet the small farmer who kept a cheap bull, and the man who had got no bull at all and who went round to the farmer with the cheap bull. He hoped the Minister would do his best to see that the fees to small farmers were between 20s. and 25s.—preferably the former.

Mr. Wilfrid Roberts (Cumberland): In reply to one hon. Member who asked if the scheme had really been tried out, said it was worth pointing out that, as in some other fields, research work was, he believed, done here in England many years ago. In fact, in Cambridge under Dr. Hammond, the principles and practices of artificial insemination were established before the war, but it fell to other countries to practise it on a large scale before we did. In Denmark, the Soviet Union and the United States very large numbers of cattle and sheep had been bred in this way. A number of generations of cattle have been so bred successfully. When he was a member of a party that represented that House in the Soviet Union last winter they were told that 50,000,000 head of stock had been bred by artificial insemination in that country. This practice was not so very new or revolutionary, and he was one of the large majority who welcomed the Bill and congratulated the Minister on getting it as far as its Second Reading at last.

Scope of the Veterinary Officer at A.I. Centres

"There are, however, some points which arise," continued Mr. Roberts. "One suggestion which was made, that the veterinary officers who would be required at these stations could be of service to the small farmer in ways other than simply dealing with artificial insemination, raises the difficulty that there are already so many different advisory organisations and different officials representing different bodies, helping, advising and to some extent controlling the farmer. I do not know if it would be possible for the veterinary officer who will be attached to these artificial insemination centres, to advise also on other breeding and disease problems for the benefit of the farmers for whom the artificial insemination centres are being run. As has been pointed out in this Debate by the hon. Member for Abingdon (Sir R. Glyn), there is already a very great shortage of veterinary surgeons, and I hope the Minister will be able to relieve that shortage soon. It would be possible to use the veterinary surgeons attached to these stations in assisting farmers in their breeding and other disease problems. I do not know whether the Parliamentary Secretary will be able to say when he replies whether that suggestion would be possible under these schemes."

Another danger which had been pointed out was the possibility that the centres would concentrate too much upon milk. He hoped that that would not be so, and he did not see that it was necessary. The great advantage of these centres was for the small farmer, who could have his milk production a great deal raised before he got to the 1,000 gallon average, and who was at the present time using a very indifferent bull. He was afraid the great danger was that the standard of health of the cows would be undermined by producing too much milk, but at any rate he hoped that some of the breeds used would be those which had good stamina. He did not know that some of the milk breeds necessarily had less stamina than the others.

He would like to ask how many centres there are. They had been told by the Prime Minister that he envisaged orderly development, and he joined with him in so doing. He asked the Minister what he really intended as the number of centres which could be established in the next year or two? What was the orderly plan of development? It was important to know the number of stations and the size of the districts they would cover.

Mr. York (Ripon) wanted to know whether it was a fact that artificial insemination was a way of reducing trichomoniasis. Did the actual sperm which was transferred carry the disease with it? They ought to have information on that point, so that, apart from testing the bulls for other diseases, they might be tested frequently in order to see that they had not this particular disease.

With regard to proven bulls, he thought the Minister was aware that we were very short of them. If one set out to buy a proven bull it was almost impossible to do so. If he went ahead with that scheme, he would find that there would not be enough of those bulls to go round and that a large number of second-class bulls would be used. He would ask what estimate the Ministry had of the number of those bulls which would be required in each successive year, according to the plans of the Minister and those of the Milk Marketing Board? What steps did the Minister intend to take, if there was likely to be a shortage, to bring the number up to requirements?

A third danger was that of cross breeding. Let it be clearly recognised by all concerned that artificial insemination was the direct road to the most widespread cross breeding that the country had ever seen. There was also the danger of increasing some of the breeds which we knew to be, or thought to be, not so desirable and yet a further danger was the elimination of dual purpose cattle. "The Ministry of Agriculture are accused, and in my opinion very rightly accused, of wishing to specialise. Some of their officers have a one-purpose cattle complex, and to try to push that complex wherever their influence may extend is a very dangerous thing. We want to see cattle which, when they are sold at the end of their life, have a good carcase, cattle which will breed good carcases in the unwanted heifers. To use a phrase of that eminent agriculturalist, Professor Engledow, 'the inherent agricultural characteristics of this country' demand a dual purpose type of cattle. Artificial insemination will put all the emphasis upon milk, and unless the leaders who take charge try to direct the operations of these committees we shall see the milk strain becoming more and more apparent and the carcase qualities of the beasts disappearing altogether."

He had two concrete suggestions on points which he would like the Ministry to watch in the administration of this Measure. The first was that they should see to it that there was a bull of the smaller breeds in those areas where there was the greatest concentration of herds, and the second was that in regional centres—perhaps amongst a group of centres—there should be as far as possible a total range of bulls of all the breeds of which there are herds in that region.

He wished to know how the centres were to be run, and whether the Ministry itself would operate any centre or not. He also wanted to know whether the Ministry itself would conduct research into the various aspects of artificial insemination.

Mr. Collins (Taunton): They already knew that the two main centres were at Reading and Cambridge, but there were other private centres already functioning such as are intended under the Bill, and one of those was at Ilminster. It would be interesting to hon. Members to know of the provisions made at that centre to ensure that the dangers of which hon. Members had expressed their fears did not arise. After all, the Minister drafted a Bill and created, in effect, the framework, but it was for the industry to see that the thing worked, and if the Minister were to include too large a number of Regulations farmers would feel far too cabined and confined in the matter. At Ilminster the committee resolutely refused to allow cross-breeding. When farmers agreed to have their cows served by artificial insemination, they were asked to put down in writing their breeding plans, and, of course, they were given advice and help in so doing. They were not allowed to alter those plans, but must adhere to them, and if they wished to change or to cross-breed they must get the approval of the War Agricultural Committee under the "Livestock Improvement Scheme." To his mind that was a very considerable, and, he would indeed say, sufficient safeguard, because after all farmers had a good deal of common sense, and if they received advice, if the dangers were pointed out to them, and if, above all, they tabulated a real breeding scheme and had to adhere to it, quite obviously it must be far more successful than the present ordinary methods, which were very frequently haphazard. There was no difference in essence between cows served by artificial insemination and those served in the ordinary way. There was simply no difference, there could not be, and, therefore, many of the imagined dangers did not exist.

Another very important point that had been mentioned was the advantages which were likely to accrue in the fight against disease. The general public was very much interested in this matter. People were interested in increased milk production, and since it was unlikely that there would be any considerable increase in the labour force available to agriculture for a long time, this method was the one that was most likely to permit of an early increase in milk production, as it would enable farmers with a low average gallonage to increase their average. The general public was very keenly concerned about the question of animal diseases, and he suggested that artificial insemination could prove very helpful in this matter. For instance, in respect to contagious abortion, which was a very big deterrent to milk production, the Ilminster centre made an experiment with 21 sterile cows. After treatment by the iodine irrigation method, the 21 sterile cows were treated with artificial insemination, and 18 of them were got in calf. That was an extraordinary tribute to this system. He would also point out that there would be a considerable saving in keep as the result of the reduction in the number of bulls.

It was most important that the Central Advisory Committee should get down to the job of planning the centres according to geographical factors and cow density. They should take out the map and decide where the centres were to be on the basis of geographical factors and the number of cows in the areas. He did not mean that they should proceed immediately to the erection of these centres, but that they should decide that the centres would be put up in certain places. They should avoid over-concentration in certain areas, such as the places where there were Milk Marketing Boards.

There should be comparisons between the results obtained at the centres at Reading and Cambridge and the centres elsewhere, and a general pooling of all information and ideas. It was necessary that the results should be published as widely as possible, since obviously, both in the House and outside, there existed a good deal of prejudice against this idea which, he thought, was largely the result of insufficient knowledge.

He hoped the Minister would also consider ways and means of raising standards for the registration of ordinary bulls. They must retain only the best animals, and he felt that many which were now registered ought not to be used for breeding purposes. The Bill also covered other livestock, and extended to horses and pigs. It certainly offered a means of speedily increasing the number of pigs and a means of assisting in the breeding of a standard type, or standard types, of pigs in order to build up a bacon industry, which was very badly needed in this country, and which could be successfully achieved only if we bred a suitable type of pig. In that matter the Bill could help. It was a small Bill which, if properly used, could have very far-reaching results, and he welcomed it as a valuable contribution to an increase, and an improvement in the food production of this country.

Colonel Ponsonby (Sevenoaks), as a member of the Bee Diseases

Advisory Committee, expressed gratitude to the Minister for including bees within the provisions of the Bill, and said that if what was proposed was carried out fairly lavishly it would be of great good to the industry and the community. Very little was known about the bee industry, although many people kept bees. Perhaps he might be allowed to speak for the industry, because for several years, at the request of the late Minister of Agriculture, he had been a member of the Bee Diseases Advisory Committee. This Committee was directing its efforts mainly to eradicating disease in bees—such as foul brood and acarine disease, but in addition it did what it could to advise the bee-keepers of the country. It was hardly necessary for him to point out the merits of bee-keeping from the point of view of honey production and the improvement of orchards. A great deal had been done, and a great many improvements had been made, but the Committee had always felt that at some time or another it would be absolutely essential to have registration of bee-keepers, because two or three scrub hives which were diseased might undo all the good that the Bee Diseases Advisory Committee has done in trying to improve stocks and keep them clean

The Committee was advised almost entirely by Professor Butler of Rothamsted, and he wished to pay a great tribute to the work done by him and those who worked with him. His fame was not restricted to this country. When he was in Moscow recently, he met the professor of bee-keeping of the U.S.S.R., and he was full of praise for the work done by Professor Butler of Rothamsted. But all this work required money. He was, therefore, very glad that the Minister had included bee-keeping in that Bill. When he was at Rothamsted, he saw the miserable premises in which that research was being done, and it was impressed upon him how very necessary it was to improve the premises there. It might be advisable to make other centres, and certainly to increase the staff. He was grateful to the Minister for having included bee-keeping under the Bill, and he was certain that what was proposed, if it was done fairly lavishly, would be for the good of the industry and of the community in general.

Mr. Kenyon (Chorley): Like some other hon. Members he felt that unless the charge to the farmers was made much lower, it would act as a deterrent. At the present time charges were not heavy, but there was a large number of milk producers who ran what was known as "flying herds." The flying herd was a very great danger, because there was no continuity of breeding policy in that herd. A cow was simply brought into the herd, milked out, and then sent back into the market. The man with a flying herd did not care what kind of a bull he got; all that he desired to get, and did get in the main, was a cheap bull. Unless the fee for artificial insemination was lowered, the man with the flying herd would not use it, and would not take advantage of the scheme. Therefore, the flying herds would not be improved. It must be remembered that the calves from these flying herds entered the market just like any other calves. They were picked up by rearers, who very often judged them on the outward signs, the physique of the calf, its good colour, or its good shape. They knew nothing whatever about its breeding or about its dam's production. He felt that unless the charges for artificial insemination were decreased, the large farmers who run flying herds would take no notice of it.

When you had calves coming from artificially inseminated cows, and you had the advantage of good bulls, there ought to be some scheme whereby the calf could be followed to the rearing farmer. Otherwise its dam or its sire would not be known. One of the advantages of this scheme would be completely lost unless the history of the calf could be followed. The Ministry would be well advised to see that some calf scheme was set up following upon the extension of artificial insemination.

He felt that many of these schemes would fail unless there was a greater extension of milk recording. Milk recording was necessary, because, no matter how good a bull you got, in the finest herds you had always some cows that were failures. It was necessary, in introducing good bulls into any herd, to be able to eliminate the cows that would always be failures, otherwise we should continue to have the old difficulties.

"Bull Palaces"

Mr. Hurd (Newbury) said that he had heard that the Milk Marketing Board were proposing to select first-class building sites with electricity, water and sewage facilities on the outskirts of towns for buildings which were to be inseminating centres and that some of these would cost up to £12,000. If the Milk Marketing Board and the other organisations were to be encouraged by the Government to go in for grandiose building schemes, they would not see as quickly as was desirable the benefit of this Bill, because the money would not go far enough. He was told that in Denmark, artificial insemination schemes were going forward and were supported by 60,000 cattle owners and that 400,000 cows had been artificially inseminated. And there they were not putting up bull palaces such as were apparently contemplated by the Milk Marketing Board. He urged the Minister not to allow building materials and labour, which were urgently needed for houses for human beings, to be used to provide palaces for bull, when the bulls could be housed in much more humble buildings.

The Reply

The Joint Parliamentary Secretary to the Ministry of Agriculture (Mr. Collick): The Debate had confirmed the Government's anticipations that there was no serious opposition in any quarter of the House to the proposals of this Bill. The right hon. Gentleman the Member for Cirencester (Mr. W. S. Morrison) who followed the Minister in this Debate, made the point that he was a little sceptical as to the balance of good or evil in the processes of artificial insemination, and it was obvious during the Debate that there were other speakers who, to some extent, shared that view. But it was worth observing that, despite that element of doubt, every one of the speakers was wholeheartedly in support of the provisions of the Bill.

Mr. W. S. Morrison: "My point was not that I cast doubt on the merits of the Bill itself or the process which it legalises, but I ventured to doubt whether, on the whole, some of the breeding activities of dogs did dogs any good."

Mr. Collick: He appreciated the point which the right hon. Gentleman made, but he was sure he would readily appreciate, too, that the major purpose of the Bill was not necessarily for show purposes of cattle but was essentially much more designed for utilitarian purposes. He could well follow the line of his reasoning and he was not at all unsympathetic to what he gathered to be his main point, which was that, in the whole of the development of the practice, a very close observation should be kept upon what developed from it and that Government policy should be guided from time to time in the light of accumulated knowledge derived from the experiments going on and its practices. He had had consultations with the Minister's advisers about the whole matter and he could wholeheartedly assure the House that the Government would keep the very closest watch on developments. There would be intensive research and we would be guided, obviously, by what developed from those researches.

The hon. Member for Abingdon (Sir R. Glyn) raised the point as to the radius in which the centres presently operate, and the real answer to that was, that there was no arbitrary line about this matter. At the moment it had been found economical and desirable to limit the radius to 15 or 20 miles but with the development of stations that would go on when this Bill was passed, the Ministry had something like an open mind on the matter. If a case could be made out for an extension of the radius, there was no reason, as far as he knew, why that should not be reasonably considered. It had been, as he understood it, rather a matter of what was sensible economy in the radius covered and that was the real reason why the radius was what it was.

"Another point which the hon. Gentleman made," proceeded Mr. Collick, "was as to whether there could not be some development of the veterinary service under the scheme for the small men. I am certain that everybody in this House who is interested in agriculture and kindred industries, is only too familiar with the general shortage of veterinary surgeons and I do not want to go too far, but I think I can say that the Minister is having consultations with the parties properly concerned in that matter, and is trying to find some way in which the veterinary services can be developed in the country. I think I know his mind sufficiently for me to say that, if in the course of the development of the centres, it becomes possible to include any facilities in that direction, having regard to the importance of animal health, he would obviously only be too willing to give the most reasonable and sympathetic consideration to it."

Perhaps he ought to say something in regard to the point made by the hon. Member for Northampton about cross-breeding, although he did not want to enter at all into the technicalities, and this applied to several other points which hon. Gentlemen on the other side of the House had made. The Minister in this matter had the services of a most competent advisory committee, the members of which were of the highest standing. Several hon. Members had made points on this question of breeding, cross-breeding and in-breeding, and, here again, he would say that the Minister would pay the closest attention to any recommendations or advice which comes from his expert Advisory Committee.

The Government was naturally concerned to see that this did not become a profit-making service. As a matter of fact, one of the aims of the Bill was to see that it did not become a matter of commercial exploitation. That was why the producer-controlled societies were specially provided for in the terms of the Bill, and the Government would keep a very close eye on the cost of the service. It was the fact, at the moment, that the cost in the stations at present operating ran from 22s. to 25s. and one, he thought, was £1. He thought it would be possible

to make out quite a good case that the present basis of the cost of the service was very satisfactory, having regard to the fact that the service rendered was from the highest quality bull.

Several other hon. Members made the point that they hoped that the provisions of this Bill would be of great help to the small farmer. He wholeheartedly endorsed that suggestion and he would say that one of the real objects of the Bill was to give special assistance to the small farmer. It was one of the main aims which ran right through the Bill, because it was recognised that the present arrangement was not at all satisfactory. The smaller type of farmer at present was unable to afford the capital cost which a good bull involved, and, therefore, this arrangement of artificial insemination centres would enable him to have the best possible service. . . . He thought it could be said, by and large, that there were other countries going ahead in this matter. "Science, in its diverse forms, goes on, whether it is genetics or any other form of science, and the one thing which we would not wish would be for this country to be left behind in the development of this practice. One of the aims of this Bill is to ensure that we are not left behind, as, I am afraid, this country has been left behind in many instances which we could quote. It is because the Government are satisfied that this is a matter which should be developed that this Bill has been introduced."

As to the Government's policy in relation to the number of centres that would be developed, here, again, they must be guided by the advice of competent people. The main consideration which determined the opening and development of these centres was, first, the cow population in the area, and the extent to which it could be established that, for that cow population, bearing in mind the number of small herds and the like, it was desirable to have a centre more speedily than in another place; also there was the question of the incidence of disease. "On the question of trichomoniasis, I can say that there is evidence that artificial insemination has lessened its incidence. One of the centres which has been opened in the North Wales area has lessened very considerably the incidence of that disease, and that gives special point to the remarks of an hon. Member opposite on the relative value of good and evil. We shall be guided by experience in this matter. I also want to tell the hon. Member, who referred to an orderly plan, that this makes a great appeal to this Government. An orderly plan in this matter is no less important than in the general economic policy of the Government, and I can assure him that we shall have an orderly plan."

Mr. Wilfrid Roberts: "Will the Minister give a little more specific information of what that plan is? Does he propose to open 100 centres, 50 or 25, in the next two years?"

Mr. Collick: "The answer is—and I am sure the hon. Member will readily appreciate it—that we are not wholly the masters in this matter. Building is the chief factor, but there is a plan, and there are two orders of priority—first and second—listed in relative importance, as determined by the Advisory Committee. I think that, when building labour becomes available, together with the other ancillary people whose labour is necessary, the hon. Member can rest assured that that plan will be developed in an orderly way."

Mr. York: Can we have any more details of how many centres?

Mr. Collick: I did not want to bother the House with unnecessary details.

Mr. York: We want them.

Mr. Collick: "I will try to be helpful to the hon. Gentleman. I will give an indication of those on the first priority list, though I hope we shall not have any competition between hon. Members staking their claims. Cheshire is on the first priority, obviously on account of its dairy herds, and Durham, Devon, Shropshire, East Suffolk, Wiltshire, Yorkshire and Carmarthenshire. Those are on the first list."

Mr. Snadden (Perth and Kinross, Western): "Can the Minister say anything about Scotland?"

Mr. Collick: "I am in the closest touch with my colleague in the Scottish Office, and I am sure that the Under-Secretary for Scotland will be only too pleased to give the hon. Member information on that. The hon. Member for Ripon (Mr. York) also asked about the availability of proven bulls. We are not anticipating any difficulty in getting the bulls of the requisite quality to stock the centres, and I am quite sure that we shall have stock of the highest quality for meeting that demand. The hon. Member for Newbury (Mr. Hurd) made reference to the fact that the policy of the Milk Marketing Board may be to have rather elaborate premises. He knows, no less well than any hon. Member of the House, that the Minister, by a process of Rules under which these centres are managed, has certain ways in which he can have supervision in that regard. I am quite sure that this Government, which is anxious to get houses built for ordinary people, will be quite unwilling to have palaces built for bulls. I think the hon. Member need have no fears that the Minister will exercise his powers in that respect."

Mr. Hurd: "Will the Minister review some schemes already in an advanced state of preparation, because it does appear that they are perhaps on rather extravagant lines?

Mr. Collick: "I can assure the hon. Member that we are in consultation with the Milk Marketing Board and that we aim to keep down prices, because, obviously, they will affect the price of the service. I would conclude by saying that I commend this Bill to the House. We are satisfied that it will be of service to the farming industry, and that it will be of particular service to the owners of small herds, and we shall watch the whole development with the closest attention."

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Government Policy for Agriculture

The Minister's Statement

In the House of Commons on Thursday of last week Mr. Tom Williams, the Minister of Agriculture, made a statement on the general principles of the Government's agricultural policy. These proposals follow broadly the recommendations made by the conference of all agricultural interests convened last year by the Royal Agricultural Society, and its main feature is the introduction of a system of guaranteed prices and assured markets for our main agricultural products.

Mr. Williams said:—

I am now able to indicate in broad outline the general principles on which the Government's agricultural policy will be based. As stated in the Gracious Speech the Government will develop to the fullest possible extent the home production of good food with due regard to the recommendations of the conference on food and agriculture at Hot Springs. The objective will be to promote a healthy and efficient agriculture capable of producing that part of the nation's food which is required from home sources at the lowest price consistent with the provision of adequate remuneration and decent living conditions for farmers and workers, with a reasonable return on capital invested.

To this end the Government propose to establish as an essential and permanent feature of their policy for food and agriculture a system of assured markets and guaranteed prices for the principal agricultural products—namely, milk, fat livestock, eggs, cereals, potatoes and sugar-beet.

The annual price reviews instituted in February, 1945, will be continued, together with provision for special reviews in exceptional circumstances. After these reviews prices for cereals, potatoes and sugar-beet will be fixed by the Government 18 months ahead of the harvest.

Price-fixing System

The existing system of fixing prices for fat livestock, milk and eggs will be developed so as to cover the period after June, 1948, when the existing guarantees would otherwise cease to operate. These branches of food production entail advance breeding and other commitments for the farmer, and, in order to give the necessary continuous assurance of reasonable stability of prices, the Government propose to institute a new system of overlapping four-year periods with biennial reviews. For example, in February, 1946, minimum price levels will be considered and fixed for the two-year period ending June, 1950, and in 1948 for the period July, 1950, to June, 1952. These minimum price levels will apply to milk, fat cattle and fat sheep, for which guaranteed minimum prices have already been announced until June, 1948, and to fat pigs and eggs. Actual prices for all these products will continue to be fixed in advance for 12 monthly periods after each successive February review.

All prices—minimum and actual—will be fixed with due regard to the need for the greatest possible efficiency and economy in methods of production. Account will also be taken of any modifications in the character of the agricultural output which may be necessary to meet changing national requirements. If it should become necessary to apply a quantitative limitation to any section of the assured home market this would be announced 18 months before the harvest in the case of crops (*i.e.*, after a February review), and at least two years in advance in the case of fat livestock, milk and eggs (*i.e.*, after a biennial review).

Thus farmers will always know the prices for cereals, potatoes and sugar-beet well before the time comes for sowing those crops. For fat livestock, milk and eggs they will know minimum prices three or four years in advance, and actual prices some three

15 months in advance. In all cases they will be given ample notice of any quantitative limitation which may be imposed on the assured market.

Assured Markets

The actual method of affording to the farmer an assured market and a guaranteed price will be worked out for each commodity, with due regard to the system to be adopted by the Government for the procurement, distribution and sale of all those foods—home-produced and imported—which play an important part in the nation's diet. The Minister of Food has already announced that detailed plans will be worked out by the Government, in consultation with the interests concerned, to give effect to this policy. Methods other than that of direct Government purchase (for example, the deficiency payment system of the Wheat Act) will not be excluded.

Legislation will be required to amend the statutory provisions with regard to wages regulation in the light of the war-time experience of central wage-fixing machinery.

As a corollary to the provision of this substantial measure of security of markets and stability of prices the Government propose to take appropriate steps to ensure that agricultural land is not only properly farmed but properly managed and equipped and to promote improved efficiency in the production, marketing and distribution of home food products. Free technical advice will be made available to agriculturists to improve their farming efficiency.

In order to deal effectively with the minority of farmers and landowners who fail in the responsibilities attaching to the occupation and ownership of land, the Government propose to seek power in permanent legislation to exercise certain necessary measures of control. Such farmers and landowners will be subject to a period of supervision during which compulsory directions may be served, and in the last resort will be dispossessed if, after a reasonable period, it becomes evident that they are unable or unwilling to improve. There will, however, be a right to make representations to an independent tribunal before a tenancy is terminated by the Minister or an owner-occupier or landowner dispossessed.

Systems of marketing and distribution will come under review as part of the detailed investigation announced by the Minister of Food, to which reference has already been made.

Powers will be sought to enable the Agricultural Ministers to acquire land by voluntary negotiation; or compulsorily in cases of dispossession or where public ownership is the only means of securing the full productive use of the land.

The Government propose to set up a Commission for the purpose of managing and developing for agricultural use land acquired under these powers in England and Wales.

Local bodies will be required to assist in the execution of this policy and to provide the industry with local leadership and guidance. In England and Wales county committees similar to the existing County War Agricultural Executive Committees will be constituted on a permanent basis. Their primary duty will be to promote efficiency, working for this purpose in close association with the National Advisory Service which it is intended to establish in England and Wales on October 1st, 1946. They will act as the local agents of the Minister in the exercise of the proposed powers of control, and undertake certain executive services; they will also be responsible for the schemes already in existence for the training of ex-Service men as skilled agricultural workers.

It is proposed that these committees should continue to be appointed by the Minister, but that they should be reconstituted to consist in part of persons selected by the Minister from lists of names submitted by the different sections of the agricultural industry, and in part of a smaller number of persons selected by the Minister from other sources. It is hoped that the experience of many of those who have rendered such valuable service during the war will continue to be available under the new constitution. Members of the staff of the English and Welsh committees who possess the appropriate qualifications will have an opportunity to enter the National Advisory Service. The services of others, including many of the non-technical staff, will be required in the continuing local organisation that will be preserved by these committees. Somewhat different forms of local organisation will probably be found desirable in Scotland and Northern Ireland.

Compulsory Directions

The world food shortage is extremely serious. For the time being, therefore, compulsory directions to grow sugar-beet and potatoes must be served and supervision exercised where necessary over the laying down of grass so that this process keeps in step with the anticipated increase in livestock, with the requirements of home-grown feeding-stuffs, and with the continued need for a large tillage acreage. As the world shortage of food passes the Government intend to leave farmers normally to grow the crops which their experience, supplemented by guidance from the advisory services, indicates are most suited to their own land. They intend, however, to seek permanent powers to serve compulsory directions on any farmer whenever necessary in the national interest, but those powers will normally be used only in exercising control over farms under supervision or to supplement the methods of steering production already described, should an over-riding need in national food supplies or national diet render this necessary.

The controls exercised over the distribution of fertilisers, feeding-stuffs, machinery and other farm material will be lifted or modified when supplies are sufficient to ensure free and equitable distribution.

This outline of the Government's plans for a gradual transition from the organisation and methods necessary to promote maximum food production in war-time to a permanent policy appropriate to more stable conditions will need to be worked out in detail with a view to the submission of legislative proposals to Parliament. This will be done in full consultation with the organisations representative of landowners, farmers and workers. The Government hope that with this assurance of their intentions all sections of the industry will attack their immediate tasks with enthusiasm and confidence.

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In reply to Mr. R. S. Hudson (the immediate former Minister for Agriculture) Mr. Morrison agreed to allow a debate on the statement, while Mr. Williams informed Sir Charles MacAndrew that the statement applied to Scotland as well as to England.

The National Farmers' Union, in a pronouncement issued immediately after the Minister's declaration of policy, stated: "The first reaction to the policy statement as a whole is that it is a statesmanlike effort which, if developed realistically in concert with the industry, will take British agriculture well on the way towards its goal of full and permanent service to the nation."

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QUESTIONS IN PARLIAMENT

Foot-and-Mouth Disease

Mr. Lennox-Boyd asked the Minister of Agriculture how many outbreaks of foot-and-mouth disease there have been this year; how many of these occurred among pigs and may have been attributable to swill made from imported meat.

Mr. T. Williams: During this year there have been 122 outbreaks of foot-and-mouth disease in Great Britain of which 60 have been original cases, that is, cases not traceable to previous outbreaks in this country. Fifty-six of these 60 outbreaks started in pigs, and in 29 of them the outbreak has been attributed to infected swill. In a number of other cases swill may have been the cause, but the evidence is less clear.

Mr. Lennox-Boyd: Will the right hon. Gentleman bear in mind that there have been, so far as I am aware, no outbreaks at all among those who have been supplied with swill from the American camps in this country? In view of the absence of foot-and-mouth disease in North America, does he not think that fact is rather significant?

Mr. Williams: Yes, Sir, but the hon. Member must be aware that America does not import meat from sources from which this country imports, and must continue to import, meat. Perhaps that fact will add to the explanation.

Mr. Turton: What steps has the Minister taken to ensure that swill is properly processed?

Mr. Williams: The hon. Member is well aware that we are doing all that we can to persuade people who use swill to observe the Order, and, by means of our inspectors, to see that the Order is observed.

Mr. Vernon Bartlett: Cannot the Minister use a little more compulsion in these cases, because, according to his own reply, the disease arises from lack of proper processing of swill?

Mr. Lennox-Boyd asked the Minister of Agriculture how much money has been spent on research into foot-and-mouth disease in the last ten years.

Mr. T. Williams: During the last ten financial years about £250,000 has been spent on the research work undertaken by the Foot-and-Mouth Disease Research Committee.

Mr. Lennox-Boyd: Will the Minister consider substantially increasing the amount of money and time devoted to research into what is a serious, and may be a devastating, disease?

Mr. Williams: As against an average of £25,000 per annum spent on this disease, some £37,000 was spent last year, and I have no intention of reducing that sum.

Mr. De la Bere: We want to see it increased.

Mr. Lennox-Boyd asked the Minister of Agriculture whether there has been any record in pre-war years, or any information since, of the incidence of foot-and-mouth disease in the Channel Islands.

Mr. T. Williams: Between 1920 and 1939, there were two series of outbreaks of foot-and-mouth disease in the Channel Islands. In 1940, six further outbreaks occurred in Jersey, three of them just

before the occupation of the Islands by the Germans. There has been no outbreak of the disease in the Islands since 1940.

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DOGS (ILLEGAL IMPORTATION)

Sir R. GLYN asked the Minister of Agriculture if his attention has been drawn to outbreaks of an unknown form of distemper due to arrival in this country of dogs brought in, either by air or sea, by British and allied Servicemen and not notified to the authorities for isolation in quarantine quarters under veterinary supervision; and what steps he is taking to stop this practice and enforce the law.

Mr. T. WILLIAMS: In recent months there have been a number of outbreaks of a distemper-like disease among dogs, but I am not aware of any evidence to connect those outbreaks with the illegal importation of dogs from abroad by British or allied Servicemen. British and allied military authorities are co-operating in the steps taken to prevent the illegal importation of dogs by Servicemen and have prohibited the carriage of dogs in military aircraft. The carriage of dogs on military transports is also prohibited unless their importation is specifically authorised, and all such authorisations require the dogs, on their arrival in this country, to be placed in approved quarantine kennels for a period of six months. Full enquiries and suitable action are undertaken by my Department whenever there is any reason to suspect that a dog has been illegally imported.

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IRISH BULLS

Mr. KENYON asked the Minister of Agriculture whether the bulls imported into this country from Ireland are required to have a record of milk production from the dam equal to that required by his Department for bulls in this country.

Mr. T. WILLIAMS: A minimum standard of milk production by the dam and sire's dam is only required when a dairy bull licence is sought. At present the bull licensing Regulations preclude the acceptance for this purpose of milk records attained outside England and Wales.

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AGRICULTURE: PLANT PATHOLOGISTS

Sir W. WAKEFIELD asked the Minister of Agriculture whether he has considered the report recently issued by the Association of Applied Biologists on the Recruitment and Training of Plant Pathologists in Great Britain; and whether he proposes to adopt the recommendations that one or more plant pathology training centres should be established, that the level of training in plant pathology of county officers should be raised, and that the training and maintenance of students should be covered by adequate financial provisions.

Mr. T. WILLIAMS: I have seen the report to which the hon. Member refers and have remitted it to the Loveday Committee on Higher Agricultural Education, by whom it will no doubt be sympathetically considered.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Nov. 27th.—Meeting of the Agriculture Group of the Society of Chemical Industry, at the Royal College of Science, S.W.7, 2.30 p.m.

Nov. 28th.—Meeting of the West of Scotland Division, N.V.M.A., at Glasgow (George Hotel), 2.30 p.m.

Nov. 30th.—Meeting of the Royal Counties Division, N.V.M.A., at Reading (Caversham Bridge Hotel), 2.30 p.m.

Nov. 30th.—Annual General Meeting of North Wales Division, N.V.M.A., at Rhyl (Imperial Hotel), 2.30 p.m.

Dec. 4th.—R.C.V.S. Written Examinations.

Dec. 5th.—R.C.V.S. Written Examinations.

Dec. 5th.—Meeting of the Lancashire Division, N.V.M.A., at Liverpool University (Brownlow Street), 2.15 p.m.

Dec. 6th.—Meeting of the Central Veterinary Society at the Conway Hall, W.C.1, 2 p.m.

Dec. 7th.—N.V.M.A. Drafting Committee on Calf Husbandry and Calf Diseases, 10 a.m.; Survey Committee, 11.15 a.m.

Dec. 13th.—Meeting of the South-Eastern Division, N.V.M.A., at Maidstone (Star Hotel), 2.30 p.m.

N.V.M.A. Quarterly Meetings

The next meetings of Council and Committees will be held in London on January 2nd, 3rd and 4th, 1946, and will be in the following order:—

JANUARY 2ND

11.30 a.m. Joint Veterinary Officers and Public Health and Parliamentary Committee.

1.0 p.m. Sub-committee on First-Aid Handbook.

4.0 p.m. Organising Committee.

JANUARY 3RD

10.30 a.m. Committee on the Re-allocation of the Duties of Committees.

12.15 p.m. Finance and General Purposes Committee.

4.0 p.m. Appointments.

JANUARY 4TH

11.0 a.m. Council.

The dates have been arranged at this early stage to enable members to reserve hotel accommodation *without any delay*, because the position in London in this respect is acute, hotels being fully booked up for weeks ahead. The Council meeting will finish by 4 p.m. on January 4th.

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PERSONAL

Births.—BAXTER.—On November 18th, 1945, at Carsethorn, Kirkbean, Dumfries, to Rhoda, wife of John Baxter, M.R.C.V.S., a son, Geoffrey Gavin.

DUNBAR.—On November 10th, 1945, at Burton House, Stafford, to Pamela, wife of G. M. Dunbar, M.R.C.V.S., a son.

FRANCIS.—On November 19th, 1945, to Sally, wife of John Francis, at St. Mary's Hospital, Whiteworth Park, Manchester,, a brother for Richard and Susan.

Marriage.—CLARK—McLAREN.—On October 13th, 1945, within the Parish Church of Forfar (Old) by the Rev. D. M. Bell, B.D., John Stevenson Clark, Colne, Lancs (late of Forfar), to Jean Dorothy McLaren, Morley Place, Forfar. Present address: Stanley House, Colne, Lancs.

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Professor Miller's Further Mission.—Our readers will be interested to learn that Professor Wm. C. Miller, immediate Past-President of the N.V.M.A., has left this country for the Gold Coast, on behalf of the Colonial Office. He will return at the beginning of December.

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Professor Sir Jack C. Drummond has been re-elected President of the National Milk Publicity Council, and Mr. F. N. Gingell, of Harpenden, Chairman.

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Veterinarian Flight-Lieutenant's Gallantry.—In connection with the recently announced award of the M.B.E. to Flight-Lieutenant A. D. Stephens, M.R.C.V.S., of Frome, we are indebted to a fellow officer—a D.F.C. and Bar—who is also a member of the profession, for the following graphic account of the circumstances under which it was gained.

He writes: "Stephens was piloting a Beaufighter in the Burma area, doing low level strafing work. Taking off for an operation, one engine packed up and he had no alternative but to crash land her; fortunately he managed to pull her round off some wooded land and belly-landed in a paddy field. He was knocked out on impact, when the aircraft skidded a couple of hundred yards and then burst into flames. He came to in his cockpit enveloped in flames and somehow managed to get out. He then heard the shouts of his navigator, the only other member of the aircraft, who was apparently trapped in the fuselage, so Stephens, regardless of the flames and a dislocated shoulder, went back to try to extricate his partner. He only gave up trying when forcibly made to do so by a rescue party from the aerodrome. He sustained severe burns and now, ten months after the accident, he is still receiving regular treatment at an R.A.F. hospital in this country. I am glad to say, though, that he looks remarkably well and in good spirits.

"I feel sure your readers will agree with me that this is a very finely deserved award."

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Rugby Reserve for England.—Mr. Michael R. Steele-Bodger, son of Mr. H. W. Steele-Bodger, M.R.C.V.S., and a wing forward who represented Cambridge University in last year's inter-'Varsity match, is one of the two Cambridge players chosen to attend at Twickenham to-day in reserve for an England XV against the New Zealand touring team.

R.C.V.S. ANIMAL MANAGEMENT EXAMINATION

List of Successful Candidates

(Continued)

Edinburgh:

Anstruther, Miss J. D. (credit).
Ashworth, G. H. S.
Birrell, Miss E. E.
Burns, K. N.
Craig, W. A.
Curry, G. D.
Davidson, Ian
Drake, J. N.
Fawell, E. V.
Fowler, B. N.
Finlay, R. A.
Galloway, Wm.
Geddes, William
Gingles, John
Hayes, G. E. (credit)
Jones, Roger
Macdonald, John
Macfarlane, D. F.
Malone, G. S. R.
Munro, I. G.
Nixon, Keith
Prescott, J. G.
Sutherland, Miss C. A. (credit).
Tench, A. H.
Tolfree, Miss L. B. G.
Walker, J. D.
Wright, Charles

Glasgow:

Dunn, T. J.
Finkelstein, B. N.
Hair, D. C.
Jackson, W. T.
Jarrett, F. H. (credit).
McMeekin, W. J.
Mount, Miss E. D.
Paton, I. M.
Ritchie, N. D. (credit).
Sutton, Miss B. M.

(To be concluded)

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ROYAL SOCIETY AWARDS

The King has approved the recommendations made by the council of the Royal Society for the award of the two Royal Medals for the current year to:—

Professor J. D. Bernal, for his work on the structure of proteins and other substances by X-ray methods, and for the solution of many other problems requiring a physical approach.

Dr. E. J. Salisbury, for his notable contributions to plant ecology and to the study of British flora generally.

The following awards of medals have been made by the President and Council of the Royal Society:—

The Copley Medal to Dr. O. T. Avery, for his success in introducing chemical methods in the study of immunity against infective diseases.

The Davy Medal to Professor Roger Adams, for his extensive researches in the field of organic chemistry and his recent work in the alkaloid field.

The Hughes Medal to Professor B. F. J. Schonland for his distinguished work on atmospheric electricity and other physical researches.

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PROPOSED ACADEMY OF MEDICINE

The proposal to bring the three royal medical colleges together on one site was referred to by Sir Alfred Webb-Johnson, President of the Royal College of Surgeons, at the annual meeting of Fellows and members of the college, held last night at their premises in Lincoln's Inn Fields, states *The Times* in its issue of Friday, November 16th, and continues: "The project was ventilated in the correspondence columns of *The Times* early this year, when members of the medical profession, including the late Lord Dawson of Penn, supported the suggestion that there should be an alliance of the three royal colleges in adjoining premises in Lincoln's Inn Fields under the title of 'An Academy of Medicine.' Lord Moran, President of the Royal College of Physicians, opposed the suggestion.

"At yesterday's meeting Sir Alfred Webb-Johnson said that the Council of the Royal College of Surgeons had pledged itself to the idea and also £100,000 of the funds of the college to provide the opportunity.

"The Registrar of the Royal College of Physicians had written stating their view that the present interests of their college would best be served by their remaining in their present premises in Pall Mall.

"Sir Alfred Webb-Johnson read a long letter, dated November 9th, which he had sent to Lord Moran in reply, at the request of the Council to the Royal College of Surgeons. In this he wrote that the advantages to be gained by the three colleges coming together on a common site were so great that his council had decided to keep the present opportunity open by retaining the properties it had acquired in the hope that, on future consideration, the Comitia of the Royal College of Physicians would decide to co-operate in the establishment of a medical centre in Lincoln's Inn Fields. The Council would not enter into negotiations to dispose of the sites for any other purpose without first informing the other royal colleges. The letter also stated that on December 16th, 1941, a resolution was passed by the standing joint committee of the three royal colleges, later confirmed by the governing body of each college, that the desirability of bringing the buildings of the three royal colleges into close proximity was of infinitely greater importance than that of attachment to any particular site. The Royal College of Surgeons had acquired sites in Lincoln's Inn Fields which were more than adequate for the requirements of all the royal medical colleges and specialist associations.

"The Royal College of Obstetricians and Gynaecologists had expressed its readiness to move to Lincoln's Inn Fields if the Royal College of Physicians should decide to do so. . . . A medical academic centre, in which each college would retain its identity, would have great imperial and international influence. . . ."

A resolution was passed with acclamation endorsing the Council's action in keeping its offer open.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Foot-and-Mouth Disease:

Middlesex.—Field View, Fore Street, Eastcote, Pinner, Middlesex (Nov. 12th).

Swine Fever:

Denbighshire.—Ddolhir, Glynceiriog, Wrexham, Denbigh, Denbighshire (Nov. 12th).

Dumbartonshire.—No. 30 Holding, Auchinkiln, Condorrat, Glasgow, Dumbartonshire (Nov. 12th).

Glos.—Home Farm, Swindon, Cheltenham, Glos. (Nov. 13th).

Hunts.—Scradge Bank, Ramsey, Hunts. (Nov. 16th).

Lincs. (*Lindsey*).—Rodney Hotel, Horncastle, Lincs. (Nov. 15th); Scrub Lane, East Halton, Grimsby, Lincs. (Nov. 16th).

Warwicks.—Boddington Farm, Luddington, Stratford-on-Avon, Warwicks (Nov. 12th).

Sheep Scab:

Westmorland.—Dale Foot, Helton, Penrith, Cumberland (Nov. 15th).

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Exemption from Purchase Tax of Certain Drugs

In May this year the N.V.M.A. considered the draft of an Order which the Lord Commissioners of His Majesty's Treasury proposed to make under Section 20 of the Finance (No. 2) Act, 1940, directing that purchase tax shall cease to be chargeable on certain essential drugs and medicines of an exceptionally costly character, and preparations thereof.

The Association made representations with a view to having additional products used in veterinary practice exempted from purchase tax and some of these recommendations have been accepted (see products marked with an asterisk in the sub-joined list).

The following information is embodied in a Press Notice on the subject recently issued by the Commissioners of Customs and Excise:—

Purchase Tax

The Treasury have made an Order under Section 20 of the Finance (No. 2) Act, 1940, entitled "The Purchase Tax (Exemptions) (No. 2) Order, 1945," the effect of which is to exempt from Purchase Tax the drugs which are specified in the First Schedule to the Order, reproduced below.

The exemption applies only to goods which are delivered on sale, or appropriated to retail trade or similar purposes, on or after October 20th, 1945, or, in the case of imported goods, which are entered with the Customs or delivered from bonded warehouse for home consumption, as the case may be, on or after October 20th, 1945. No rebate of tax can be allowed on goods in retail stock which have already borne the tax.

The effect of the new Order is to amplify and in some respects to recast the list of drugs already exempted under The Purchase Tax (Exemptions) (No. 1) Order, 1941. A revised Notice No. 78 B incorporating in a single Schedule all the exempt drugs will shortly be issued.

Schedule of Drugs exempted from Purchase Tax as from October 20th, 1945

1. Perfumed ethyl chloride; Vinyl ether; Acetarsol, salts thereof and preparations containing not less than 9 per cent. by weight of acetarsol or the equivalent thereof; Any one of the following substances, prepared for use by injection: Bismuth, and compounds thereof, Mercury, and salts thereof; The diethylamine salt of 5:5-diethylbarbituric acid and the diethylamine salt of 5-allyl-5-isopropylbarbituric acid prepared together for use by injection.

2. Preparations consisting only of phenothiazine and one or more of the following things, namely, an excipient, vehicle, base or preservative.

3. The following substances, and preparations consisting only of one of those substances and one or more of the following things, namely, an excipient, vehicle, base or preservative: Compounds whereof the sole constituents are insulin, a protein other than protamine and zinc; Hormones produced from the anterior lobe of the pituitary gland, the following—growth hormone, thyrotrophic hormone, lactogenic hormone, gonadotrophic hormone—and combinations of any two or more of those hormones; Esters of stilboestrol, esters of hexoestrol, dienoestrol and esters of dienoestrol; Methyltestosterone, and esters thereof; Chorionic gonadotrophin (equine); •Calcium borogluconate; 4:4¹ diamidinophenylether di-(β-hydroxyethanesulphonate); The dimethylcarbamic ester of any 3-hydroxyphenyl-trimethyl-ammonium salt or of any 3-hydroxyphenyl-trimethyl-ammonium alkyl salt (other than the methyl sulphate); •Sym-diquinolyl-6:6¹-carbamide-1:1¹-bismethyl-methosulphate.

4. (1) The following substances, and preparations consisting only of one of those substances and one or more of the following things, namely, an excipient, vehicle, base or preservative: Amethocaine hydrochloride; Bismuth tryparsamide; α-Butyloxycinchoninic acid diethylethylene-diamide, and salts thereof; 3:4-Dihydroxy-1-(α-hydroxy-β-aminopropyl) benzene hydrochloride; Ephedrine, and salts thereof; Hyoscine, and salts thereof; Esters of morphine, ethers of morphine, and salts of any such esters or ethers; Nikethamide; Oxophenarsine, and salts thereof; Penicillin salts as defined by paragraph 1 of the Schedule added by the Therapeutic Substances Amendment (No. 2) Regulations, 1944 (made under the Therapeutic Substances Act, 1925, to the Therapeutic Substances Regulations, 1931 (so made), as in force at the date of this Order: Pentose nucleotide, and salts thereof; Pethidine hydrochloride; Sodium aurothiomalate; Sodium aurothiosulphate; The sodium salt of 1-methyl-5-allyl-5-isopropyl-barbituric acid; The sodium salt of 5-ethyl-5-(γ-methylbutyl)-thiobarbituric acid; The sodium salt of 5-Δ²-cyclohexenyl-5-allyl-thiobarbituric acid; Tryparsamide.

(2) Preparations consisting only of two or more of the following substances, whether with one or more of the following things, namely, an excipient, vehicle, base or preservative, or not; (*a*) the substances specified in the preceding paragraph; (*b*) pituitary (posterior lobe) extract as defined by paragraph 1 of the Fifth Schedule to the Therapeutic Substances Regulations, 1931 (made under the Therapeutic Substances Act, 1925), and other preparations of the posterior lobe of the pituitary gland; (*c*) the substances specified in the Schedule to the Purchase Tax (Exemptions) (No. 1) Order, 1941, in the entry containing a list beginning with the word "Adrenaline" and ending with the words "The sodium salt of 5-ethyl-5-(α-methylbutyl)-thiobarbituric acid"; other than preparations specified in the Schedule to the said Order of 1941.

5. Preparations consisting only of one of the following substances and any aminoacridine flavine, whether with one or more of the following things, namely, an excipient, vehicle, base or preservative, or not: Para-aminobenzenesulphonamide, salts of para-aminobenzenesulphonamide, derivatives of para-aminobenzenesulphonamide having any of the hydrogen atoms of the para-amino group or of the sulphonamide group substituted by another radical, and salts of such derivatives.

6. Derivatives of hydroxy-mercuri-amino-propane, derivatives of hydroxy-mercuri-amino-propylene, and preparations consisting only of a derivative of either of those substances and one or more of the following things, namely, an excipient, vehicle, base or preservative or theophylline.

7. Preparations of stomach containing the haemopoietic principle thereof in a concentrated form and preparations consisting only of any such preparation of stomach as aforesaid and one or more of the following things, namely, an excipient, vehicle, base or preservative, a salt of iron or a vitamin of the B complex (but not including desiccated stomach or preparations consisting only of desiccated stomach and one or more of the following things, namely, an excipient, vehicle, base or preservative).

8. Therapeutic substances intended to be used solely for veterinary purposes, if prepared for use by injection or by application to the scarified skin, the following: •Bacillus coli serum; •Corvne pyogenes toxoid: Staphylococcus toxoid; •Struck vaccine; Swine-fever (crystal violet) vaccine.

NOTES

Paragraph 1.—Unperfumed ethyl chloride is already exempt from purchase tax.

Paragraph 2.—Phenothiazine by itself is already exempt from purchase tax.

Paragraph 3.—Insulin-protamine-zinc, and the dimethylcarbamic ester of 3-hydroxyphenyl-trimethyl-ammonium-methyl-sulphate are already exempt from purchase tax.

Paragraph 4.—The effect of this paragraph is two-fold. It adds to Group III set out on page 8 of Customs Notice No. 78B, dated September, 1942, the substances specified in sub-paragraph (1), and it transfers to that Group, from Group II so set out, pituitary (posterior lobe) extract.

Paragraph 5.—Para-aminobenzenesulphonamide and certain preparations containing that substance, certain derivatives thereof and salts of certain derivatives thereof, being preparations not containing an aminoacridine flavine, are already exempt from purchase tax.

Paragraph 7.—Desiccated stomach and preparations of desiccated stomach with an excipient, vehicle, base or preservative, are already exempt from purchase tax; and under the new Order will also be exempt when mixed with a salt of iron or a vitamin of the B complex.

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SIR JOHN BOYD-ORR DIRECTOR-GENERAL OF F.A.O.

Sir John Boyd-Orr, M.P., the nutritionist, has been elected Director-General of the new United Nations Food and Agriculture Organisation. Sir John went to Quebec on the British Government's last-minute invitation to act as nutritional adviser (with Sir Jack Drummond) to the U.K. delegation. Sir John (Scottish farmer and late Director of the Rowett Research Institute at Aberdeen) issued several pre-war reports on world nutritional problems which helped to pave the way to the new approach to this question.

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MINISTRY OF AGRICULTURE NEWS SERVICE

Feeding of Horses.—Farmers are expected to provide for the needs of their horses on the farm. The requirements of working horses should, therefore, be a first charge on the grain resources of the farm. A heavy horse in full employment requires, in addition to its roughage ration, from 14 to 18 lb. of oats a day to keep it in good condition. One or two pounds of oats can be saved with advantage to the horse if an equal weight of crushed beans is substituted. The beans have a distinct tonic effect and give extra insurance against loss of condition. A horse-owner who has home-grown oats, but needs bran also, should buy bran against cereal coupons that he may have for other stock and feed the other stock on the oats grown for horses. If a horse-owner is without cereal coupons, he may be allowed, when necessary, coupons for bran not exceeding a value corresponding to ¼ cwt. per month, provided he sells a corresponding quantity of oats and produces the buyer's certificate of delivery.

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Salt in Silage Making.—Salt instead of molasses has been used in ensiling aftermath grass and clover at the University College of Wales, Aberystwyth, during the last three seasons. These trials suggest that when only a limited supply of molasses is available it should be used for ensiling the succulent rich grass, and salt should be used with the more mature grass. When salt was used it was found that a most important factor was the covering for the silo. In addition to being efficiently sealed, the silo should be provided with a good cover or built under a permanent roof. The temperature in processing was the same in both methods.

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A Bull Calf Scheme Going Well.—Two years ago the Government stressed the need for a long-term stock improvement campaign. It was then that he Isle of Wight War Agricultural Executive Committee made a survey of the dairy cattle position on the island. They found that less than 10 per cent. of the bulls in use were pedigree. During the last year and a half, however, the Committee has brought over from the mainland 140 bull calves from selected pedigree recorded herds. Shortly the position in the island will be that, out of 476 registered bulls, 130 will have been supplied by the Committee. The bull calves are mainly Guernsey, a breed that for many years has been associated with the Isle of Wight. A number of Shorthorn and Red Polls and a few Friesians have also been brought over.

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A Cow's Milk Production and Maintenance Yields.—According to Dr. Hammond, out of a ton of grass a good dairy cow puts 1,456 lb. on one side for milk production and keeps 784 lb. for herself. A cow of poor stock uses 986 lb. for milk production and takes 1,254 lb. for her own maintenance.

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Poultry as Fertilising Agents.—There is ample evidence to show that the running of poultry, either in folds or on the range system, can play an important part in raising the fertility of grassland before it is ploughed up for cropping. Now that the ley system of farming is more widely practised than it was before the war and more grassland will be taking its turn as arable, it is likely that farmers will be taking an increased interest in the fertilising value of poultry, especially as and when more concentrated feeding-stuffs become available. Folding arranging can be a most economical system of manuring, particularly where a number of folds, each of about 20 to 30 growing or laying birds, are moved across a ley so that the ground is covered and manured for at least one day.

Soil Expert for India.—Dr. A. B. Stewart, Deputy Director of the Macaulay Institute for Soil Research, has left for India where he will advise the Government of India upon the organisation and conduct of research and field experimentation upon problems of soil fertility and crop production. The Council of the Institute, at the request of the Government of India and with the approval of the Agricultural Research Council and the Department of Agriculture for Scotland, has granted leave of absence to allow Dr. Stewart to undertake the mission. Dr. Stewart has, in recent years, devoted much time to problems of soil fertility in relation to both plants and animals.

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Aberdeen Chair of Agriculture.—The curators of the Strathcona-Fordyce Chair of Agriculture in Aberdeen University have appointed Mr. Thomas Lloyd Bywater, Lecturer in Agriculture at Leeds University, to the chair in succession to Sir John Boyd Orr. Mr. Bywater, who belongs to Herefordshire, is 40 years of age, and graduated B.Sc. with first-class honours in Agriculture at the University of Wales. An M.Sc. of Wisconsin University, U.S.A., he was research assistant at University College, North Wales, from 1928-29, and Assistant Lecturer in Agriculture at Leeds University from 1929 to 1934.

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Adrenalin may help to prolong the action of penicillin. Concentrations of 1 to 50,000 up to 1 to 1,000,000 are compatible with penicillin, and the blood level of penicillin is maintained for a longer period.—*Fisk, Foord and Alles in "Science."*

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

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MOLYBDENUM AND COPPER

Sir,—The scouring disease which occurs in cattle on the "teart" pastures of Somerset has been shown to be caused by an excess of molybdenum in the pasture. The condition can be cured or prevented by administration of copper although there is no lack of copper in the pasture. The clinical picture resembles the scouring disease in Holland attributed by Brouwer (1938) to deficiency of copper and resembles also the "peat scours" of cattle in New Zealand which Cunningham (1944) has recently proved to be due to a deficiency of copper in the pasture. Black cattle kept on the "teart" pastures for a long time show depigmentation of the hair which is remedied by copper treatment. Similar depigmentation of the hair occurs in cattle on pasture of low copper content in Holland and in New Zealand, and also in rats on a diet deficient in copper (McCollum *et al.*, 1939).

In a publication entitled "Minerals in Pasture: Deficiencies and excesses in relation to animal health" (Russell, 1944) I suggested that an excess of molybdenum in the diet might interfere with the copper metabolism of cattle in the "teart" areas and further that the validity of this assumption could be tested by determining the copper content of the livers of affected cattle. I suggested the copper content of liver rather than blood as the test because, although affected animals in areas of copper deficiency may show low levels of copper in the blood, especially in the later stages of acute deficiency, yet, in general, animals appear to maintain their blood copper levels as far as possible by drawing on the reserve of copper in the liver. This suggestion did not find favour in some quarters, *vide* the review of "Minerals in Pasture" published in *The Veterinary Record* on December 2nd, 1944. It is, therefore, of interest to note that some further light has now been shed on the problem by two Australian workers. Dick and Bull (1945) report low values for the copper content of the livers of cattle given small daily doses of molybdenum over a period of three years. In experiments with sheep they analysed the livers before and after six months of daily administration of molybdenum, 10 mg. in one group and 100 mg. per head daily in another, and showed statistically significant reductions in liver copper. With the higher dose of molybdenum the reduction in liver copper was significant even when a daily supplement of copper was given sufficient to double the liver copper of a group not receiving molybdenum. According to these Australian workers "It seems reasonably clear that molybdenum present in the feed of herbivorous animals may limit the amount of copper assimilated and stored in the liver" and further that "A relatively small increase in molybdenum may bring about a relative copper deficiency."

Yours faithfully,

Flora C. Russell.

Imperial Bureau of Animal Nutrition,
Rowett Institute, Aberdeen.
November 14th, 1945.

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FOWL PARALYSIS (NEUROLYMPHOMATOSIS)

Sir,—I was interested in your recent editorial on the above subject and in this connection I would draw your attention to a carefully controlled field experiment, carried out at the Duthie Experimental Farm under the auspices of the Agricultural Research Council, involving over 1,500 fowls, the results of which were published in 1937 and in 1939, and which showed that by rearing chicks from the day old stage on clean ground away from all contact with adult fowls there was a marked decrease in the mortality rate and a great reduction in the incidence of fowl paralysis. In addition, chicks introduced from a source believed to be free from the disease went down to an equal extent as the controls, when kept on the infected farm, suggesting that the disease was infectious. The isolation experiment was continued for two years and the final figures showed a total mortality on the clean ground of 20·9 with an incidence of 1·1 per cent. due to fowl paralysis compared with 76·8 and 31·4 respectively on the infected premises. The average egg production of the two groups was 217·3 and 75·1. These figures showed how it was possible by these means to reduce the incidence of disease to negligible proportions, and it was also demonstrated that the age at which isolation commenced was of importance, as after eight weeks of age it was almost valueless.

The administrative control of a disease of this nature bristles with difficulties and one cannot see a practical method of preventing the distribution of susceptible stock, imprudent though it be to allow this. Who would have the temerity to set himself up as an official judge of susceptibility? Moreover, caution must be exercised in designating strains and flocks as resistant, as it may be that the absence of symptoms is due not to resistance but to a lack of exposure to infection or that the degree of infection present is insufficient to produce clinical cases.

As a more practical measure, in the meantime, in the case of pedigree breeders, I would suggest that control and prevention may best be achieved by a careful selection of the breeding pen, discarding members whose progeny have shown evidence of the disease, but retaining pen sisters whose offspring have remained healthy, together with a strict isolation of young stock, including the use of separate attendants and separate food stores, particularly during the first few weeks of life; the use of fresh ground for rearing purposes or, if that is unavailable, recourse to the intensive system during the critical period.

In directing your attention to the early work in which I collaborated with Johnston, I seek no credit for myself, but I would point out that from the start he clung tenaciously to the belief, not then the popular theory, that the disease was infectious.

Yours faithfully,

J. E. Wilson.

Oakmount Cottage,
Lasswade, Midlothian.
November 7th, 1945.

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HAEMOLYTIC STREPTOCOCCUS INFECTION IN DOGS

Sir,—In your issue of August 25th, which has just reached us, Dr. Hare has commented on our letter of June 16th concerning haemolytic streptococcus infection in dogs. Our desire in that letter was simply to indicate in a general way the work that has already been done in regard to the subject. We had no intention to discuss the claims of the respective authors to priority nor do we propose to do so now. Stafseth's publication was put first because it was made in the year before those of Hare and Fry dealing with the same subject. It is a matter of opinion whether in stating the position we appear to have laid the wrong emphasis. If so and if we seem to have presumed to underrate the work of Hare and Fry, we immediately express our regret. Such was in no way our desire.

Yours faithfully,

F. C. Minett.
L. Sahai.

Mukteswar-Kumaun.
October 9th, 1945.